

## MILITARY MEDICINE

## ORIGINAL ARTICLES

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## American Partnership in an Uneasy World\*

*An Address delivered by*

GENERAL ALFRED M. GRUENTHER, U. S. Army, Retired,  
*President, American National Red Cross*

YESTERDAY was election day in East Germany. It is now about 3:45 in the afternoon there. The East Germans are *not* anxiously awaiting the results of the election. They *know* how it came out.

The last East German election took place 4 years ago, and 12 million people went to the polls. Each voter was given a piece of paper with a single list of candidates. The voter could only vote "for" or "against." It was not an election as we understand the term. In most of the polls they had a special arrangement—if you voted "for," you put the ballot in the box on a table near the center of the room; if you voted "against," you walked over to a box in the corner of the room. Only 84,000 out of the 12 million took that long walk four years ago. We do not yet know how many took the journey yesterday, but we can be fairly certain that the number who voted against the regime was not significant.

The East German situation, and especially the Berlin aspect, has many military and political implications for us. It underlines the necessity for unity and clear-thinking throughout the entire free world.

It is now approximately ten years since the

United States planners came to the conclusion that it would no longer be possible to defend the United States from North America. Our ramparts would have to be at a considerable distance from our shores. This resulted in the development of a collective security arrangement, and the North Atlantic Treaty was signed in April 1949. In 1951, in January, General Eisenhower went to Europe to plan for the defense of Europe as a vital part of the defense of the United States.

The Alliance concept has made considerable progress since then. The basic mission is to *prevent* a war from taking place. No nation can "win" a third World War. NATO today has 15 nations; in addition, there are security pacts with 27 other nations. This means that our fate and that of our allies are inextricably interwoven. This fact has a deep significance for us. Whether we like it or not the mantle of Free World leadership has fallen on our shoulders. To fulfill this role we must inspire confidence in our allies. We must be able to project a correct image of the United States. We must convince our partners that our interests and theirs are substantially the same because we have a common concept of freedom, which has to be preserved.

Most of us in this audience are connected with the military, some as reserve officers, and many still on active duty. We often tend to think of security solely in military terms. Certainly it is correct to say that a nation

\* Delivered to the Association of Military Surgeons November 17, 1958 at the opening of the 65th Annual Convention, Washington, D.C. General Gruenther was introduced by Major General Howard McC. Snyder, Physician to President Eisenhower.

that does not have a strong military posture is not secure. But the military aspect is only part of the problem facing us. In the years immediately ahead, it may even turn out to be a smaller part of the problem. We cannot be certain of that, but we must bear in mind that national security embraces not only military readiness, but economic, political, and psychological factors as well. The Soviet push in Berlin today is chiefly psychological—they are trying, in a high-handed manner, to force us to back down, a campaign which, if successful, would damage us very much in the eyes of the rest of the world.

In this field of psychological and political warfare, not by accident but by design, the Soviets have a tremendous capability to divide the free world. They have studied the weaknesses of the West, and they recognize that the greatest threat to our collective security is to disrupt our unity. Their attack has various facets. One is to stress to the rest of the world that settlement of world tension is fundamentally a matter between the United States and Russia. They advocate that the other countries of the world should at least remain neutral or join the Soviet bloc.

In our job of convincing other Free World peoples that our aims and objectives are essentially the same as theirs, we start with some fundamental handicaps.

Among these handicaps—when it comes to competition with a totalitarian society like that of the Soviet Union—are the freedom we enjoy and the high standards of living that this freedom has given us. As a result, we are not always well disciplined, and often not aware of how we look to others in the world. One example of what can happen was our reaction to the launching of the Sputniks a year ago. When Sputnik II went into orbit in November 1957 I was in New Delhi, India, at the International Red Cross Conference. I had a unique chance to observe how representatives from various countries viewed our reactions to the Soviet accomplishment. The press of the Far East pictured the Soviet scientific achievement as a humiliation to the United States. This was not because the headline writers were anti-US or

because the people who wrote the stories had a bad cup of coffee that morning. The quotations were from United States citizens, some of them very prominent. The impression given was that the United States was jittery—almost hysterical—at the news.

I believe that the launching of the various Sputniks will in the long run prove to be advantageous to the Free World in general, and to the United States in particular. The Russian Sputniks probably jolted us out of some of our smugness; and they have improved our attitude, I hope, toward education. However, I would have felt much more comfortable if we had been able to take the shock with the poise that befits a world leader. I believe we have learned that lesson. That is all to the good because there may be other shocks in store for us in the ups and downs of the cold war.

Although we have probably reestablished our prestige with respect to Sputniks during the past months, we have still to contend with the fundamental disadvantages, in creating a proper image of the United States, of our tremendously high standard of living. Think for a moment of the effect that our average annual national income of about \$2,000 and average life expectancy of 68-70 years has on the 380 million people of India, where average life expectancy is 32 years and average income per person is \$58 per year (15¢ a day). That very situation alone focuses a tremendous amount of jealousy and envy on a country like the United States. It requires a great deal of persuasion to convince under-privileged people that we are animated by high moral principles.

Of course, you might say, "Well, India is just an isolated case." Unfortunately, that is not true. If one considers the underdeveloped countries, you include a population of a billion and a half—and half of those people go to bed hungry every night. Our difficulty in winning the competition for the underdeveloped countries is intensified by the fact that the Western countries, and especially the United States, are growing richer, while the underdeveloped peoples continue to suffer severe poverty. When we

realize that the world population is now two billion 700 million, it is clear that if we should lose a substantial part of that billion and a half—the part that goes to bed hungry every night—we could be in real trouble from the standpoint of security. All of the guided missiles and all of the nuclear submarines and all of the airplanes and troops could not restore the balance. These weapons are vitally important, but they are not enough.

The solution to our global problems, I feel, lies in our being able to widen our horizons, to learn more about other people, to communicate better with the other peoples.

One of the elements contributing to better communication with other peoples, of course, is proficiency in languages. One of my extra-curricular duties is to serve as a member of the Advisory Committee of the Foreign Service Institute, a school which trains young men and women who have been accepted into the Foreign Service after completing college and a series of examinations. After study at the Institute, these young men and women are assigned to the many corners of the world.

Obviously, anyone entering the Foreign Service should have a foreign language proficiency. But of the last 8,000 people who have qualified for Foreign Service in every respect—academically and personality-wise—only 300 had a real language qualification. Three weeks ago we had a meeting of the Advisory Committee, and the head of the Institute was telling about the high academic standing of the most recent 900 applicants. About 220 of them had MA's, 125 had Ph.D.'s and the rest of them had other degrees. One member very quietly asked: "How many of them can speak a language other than English?" The Institute head replied: "I am afraid the number is very small, probably not over 5%."

As a result of this situation the Department of State has been forced to accept applicants who do not meet the language qualification. The Institute therefore attempts to teach its students a foreign language, giving 4-month courses in an otherwise heavy schedule. Then the personnel are urged to

continue their language studies throughout their service. All this is admittedly not very satisfactory. However, this group is probably outstanding when compared to the mass of our college graduates. As a nation we are seriously deficient in our willingness to master foreign languages.

But foreign language mastery is only a part of the overall problem of developing a better understanding among the people who should be our friends. We do very little to study the cultures and customs of other nations, so that we can function better as good partners.

It is also important to study about countries who are not friendly to us. Take the matter of medical practice in the U.S.S.R. We are only just beginning to learn about it. The Soviet doctor, like all Soviet professional workers, fits into the Marxist-Leninist doctrine that the State is supreme and that the individual is a servant of the State. As you know, our concept is that the individual is supreme and that the State serves the individual. This represents a tremendous difference.

The Soviet Union had 22,000 doctors forty-one years ago when the Bolshevik regime was established. In 1940 they had 155,000 doctors. The statistics published last year indicate that there are 344,000 doctors in the Soviet Union. The total in the U.S. is about 228,000. The last year for which we have Soviet statistics (1955) shows 16,000 graduated from medical school. The same year, by coincidence, we had our largest turnout—6,977. About seventy per cent of the doctors in the Soviet Union are women. In this country, about 8% are women, but currently in our medical colleges there are only about 1,650 women among the 29,000 students enrolled, or less than 6%. One Russian polyclinic has 94 doctors. The head doctor receives a salary of 1700 rubles a month. About 80 of the 94 doctors get 900 rubles a month. By way of comparison, a carpenter or painter receives a salary from 700 to 900 rubles a month. In terms of what it will buy, a suit of clothes costs 1100 to 1400 rubles.

Generally speaking, the level of medical service in the U.S.S.R. is lower than that in the United States. However, it is adequate, and in some fields it is very high.

In the medical field in which we in the Red Cross have had some experience, namely, that of blood, some hematologists from the West, particularly from the United States and from Britain, have visited the Soviet Union recently. They report that blood therapy is not nearly so well developed there as it is here. In fact, some Soviet doctors feel that U.S. doctors use transfusions too freely.

Our collection is in a bottle of 440 cc. Their standard collection and their standard transfusion, when they give one, is about 200 cc. Blood in the United States is donated almost entirely on a volunteer basis, and I hope it continues that way. In the U.S.S.R. donors also are on a volunteer basis but a full meal is given for each donation, the remainder of the day off, and one day added, in most cases, to their vacation.

Other interesting practices followed by the Soviet in blood therapy are the following: Antibiotics—usually penicillin or streptomycin—are added to whole blood after collection. As you know, in the United States, we do not use whole blood for transfusions after it is 21 days old. Some Soviet doctors claim that they use blood up to 100 days old, and the use of blood, 30-35 days old, is a fairly common practice. One hospital in Moscow receives a great many accident cases. When a person thus killed is brought to the hospital, 2,000 to 3,000 cc's of blood are drawn for transfusion purposes, apparently effectively. Thus far we have not had any evaluation of these practices by western hematologists.

You may be interested to know that, in the last ten years, the American Red Cross collected 22,800,000 pints of blood. Of that amount, 7 million pints were for the Defense program during the Korean conflict. This contrasted with 13 million pints for defense purposes during World War II.

Our Blood Program now costs about 13.5 million dollars each year; the second largest annual expenditure of the Red Cross. Our

total American Red Cross budget now is very large. The year before last we spent 101 million dollars; last year, the year ending June 30, 1958, the figure was 88 million. The Number One Red Cross program is service to the Armed Forces. We spend on that program between 34 and 35 million dollars a year on the average. Last year was one of our light years disaster-wise, but still we spent for aid for disaster victims 9 million dollars.

Although the Armed Forces program involves the greatest amount of money, it is also the one that gives us the greatest difficulty. There is nothing spectacular about the program, and some of the services the Red Cross renders are almost self-defeating. For example, we help the military authorities get information they need in deciding emergency leave applications. The Red Cross cannot give any Armed Forces member a leave. That is strictly a responsibility of the military authorities. But we are forever being accused of denying leave to someone, and sometimes we have a hard time getting our true story across. Take, for example, a letter I received a little over a year ago:

"Dear General:

"I do not expect to ever give another cent to the Red Cross or a drop of blood to the Red Cross, and if you have a moment I would like to tell you why. Recently, I had to undergo major surgery and with the help of my doctor I had a Red Cross representative put in for emergency leave for my husband who has been in Korea for ten months with the Army. Now instead of letting his commanding officer decide whether he should be granted this leave, you people in Washington denied it. How can you possibly make such a decision when you don't even know my husband? My recovery was slowed up considerably by my worry over my husband's worry over me. And I'll bet you he did not perform an hour's work in the ten days that I spent in the hospital.

"Recently he sent me a clipping from an Army paper that the Red Cross helped to bring home from Germany to Oregon a soldier whose dog was accused of sheep killing or something, and he was brought home to testify for the dog.



"Since the Red Cross is more concerned about dogs than about people, you and I are all through and completely washed up. And before I would give you any more blood I would cut my wrists and let it run on the ground."

"Very sincerely yours,"

I wrote to this eloquent and distressed soul to tell her that it was the sinister individuals in the Pentagon who denied her husband the emergency leave, and that we were not in the leave business. I knew that she would tear that letter into a thousand bits. So we asked one of our volunteers in a chapter about thirty miles from her town to go and see her and explain what the Red Cross did with respect to emergency leaves; that we were simply the purveyors of messages containing the facts requested by the military; and that last year we spent over three million dollars on these messages. Our volunteer was actually able to make some progress. This story does have a happy conclusion, for this year in March the lady who wrote that letter gave a pint of blood and was a Red Cross fund solicitor in her community. This is one of the few cases where we convinced a person with a gripe that the gripe was not correct.

I have mentioned this instance because it represents a difficulty that the Red Cross has in conveying the proper image to the very people it is trying to assist. This is not unlike the problem which confronts the United States in the international field.

May I sum up this series of observations by saying that I think that you as medical men can make a real contribution in assisting the United States to discharge its world responsibilities. You are in touch with people in trouble; you spend your lives in attempting to relieve distress and pain. In that work you develop a feeling of confidence in your position as a leader in your community. With that prestige you can inspire our own citizens to a greater sense of duty. Your service to humanity constitutes a living example of a

quality we all need: increased dedication to service.

It is just two years ago since I left my command in SHAPE. One of the last interviews that I had there was with a German correspondent who had been a lieutenant colonel in the German Army during the war. He had served on the Eastern front against the Russian forces throughout the war. Still ringing painfully in his ears was the fact that time after time, because of the Soviet's extreme disregard for human life, the Germans found themselves being pushed back and suffering crushing defeats. He was extremely pessimistic over the future. His theme was essentially this: "With the Soviet type of iron discipline and dedicated fanaticism, we cannot stand up against them. I know West Germany well—and I know we cannot. And I don't think you can either."

I do not agree with his conclusion, but I do agree that he had posed the problem, and I do agree that this is the challenge we face. Certainly, the Soviet competition is tough, but are we too soft to be able to respond? I think we can meet it if we recognize the difficulty, and if we continue to make real efforts to develop wisdom, patience and understanding as we undertake our international responsibilities. You may say that I am an optimist. If so, I plead guilty to that charge. But I would also like to believe that I have faith in our religious civilization and the concept of the dignity of the human individual which follows from that doctrine. We *can* solve our world problems; we *will* solve them. It will require hard work and sacrifice, but for free men there is no other way to insure survival.

It has been a real pleasure to meet with you this morning. I wish you great success in your professional careers. You are a fine group, and I am proud to have had the privilege of being associated with you throughout my military service. And many thanks for your continued support of the Red Cross.

# Present and Future Horizons for the International Rehabilitation of the Disabled

Remarks by

MAJOR GENERAL MELVIN J. MAAS\*

*Chairman of the President's Committee on Employment of the Physically Handicapped*

IT IS, INDEED, a great privilege to have this opportunity to talk to the members of your association about the problems of rehabilitation of the disabled. I have traveled extensively in foreign countries during the past few years and I am pleased to report that the entire international program of rehabilitation has received marked impetus during the past 5 years. Unfortunately, some countries have not approached the entire program of rehabilitation and placement on the same voluntary basis that we practice in this country but I am sure that a more broadminded viewpoint is being developed, particularly in Asian and African areas which gives rise to feelings of optimism for the future.

However, I believe that whatever successes we may achieve in the international field can only come after a careful reappraisal of our own practices and just how we, ourselves, are going about the task of returning disabled men and women to the work force. It is a case of the old adage—we should practice what we preach.

I mentioned this because I feel that it is a problem lying right on your doorstep which has a direct bearing on whatever future successes we may achieve in making this a truly global program.

From my own observation I believe there is a tremendous waste of man power in the military services of our country—and by that I mean particularly, the uniformed services. I believe that the military, by adhering to outdated physical requirements, is doing a great injustice to the many special

fields of effort which are now included in the over-all armed forces. It is unfortunate that the basic concept of physical requirements for all military personnel are considered in the light of possible combat duty. This is outdated thinking. Thousands of cooks, bakers, messengers, telegraph operators and similar specialists most certainly should not have to meet the rigid physical demands required of the combat soldier.

I could cite many cases to prove that many handicapped members of the armed forces have not only served with distinction but have proved themselves a credit to the uniform despite their impairments. Most of you must be familiar with the classic story of Admiral John Hoskins who, despite the loss of a leg, refused to be retired, commanded several important combat strikes from the sea during the Korean action and later served in an important post in the Military Air Transport Service. Admiral Hoskin's refusal to be retired is a classic example of human courage and determination and he has more than justified the trust placed in him even though he had lost the use of one limb.

I could also cite the case of a man who as a civilian heads a military district of the Army and Air Force Post Exchanges. He has for many years served with great devotion and ability and has proved himself an exceptional administrator. The point I wish to stress is that this man was rejected upon recommendation of the doctors for retention in the military reserve as a post exchange officer because of a laryngectomy.

If you will pardon a personal reference I served for a year on active duty in the Pentagon after I became totally blind. My duty was to consult and advise in matters pertaining to legislation dealing with the military reserve. Sixteen years in the Congress and

\* General Maas was Guest Speaker at the International Luncheon held at the Statler Hilton Hotel, Washington, D.C., November 18, 1958 during the 65th Annual Convention of the Association of Military Surgeons of the United States.

service in three wars, I believe, qualified me for this duty and I never at any time felt handicapped in performance of that mission which reminds me of an actual experience I had while on duty at the Pentagon. I was walking down one of the corridors one afternoon and bumped into an officer I had known for many years. He said, "Mel, I never heard of a General serving on active duty who was blind."

I laughed and told him that I didn't consider it very unusual. The only thing was I was the only General who would admit it.

I wish to be very frank with you when I repeat that I feel that it is a mistake to require combat physical condition of all members of the military.

You military surgeons are as much responsible as anyone for these outdated physical standards. I feel that a great many of us should recognize the tremendous changes which have occurred in our modern fighting force and—once this is done, I believe that hiring practices in the service will be improved tremendously. Industry has been far in the forefront in utilizing needed skills found in the handicapped. The military should follow suit.

I want to talk to you about another phase of it that is far more important. It is the impact of what we are doing in this country for our handicapped is making on the rest of the world.

At international conferences on rehabilitation I have attended, made up of 30 nations, including most of the Asiatic and African nations, I have talked with delegates from the Philippines, from Thailand, Ceylon, Pakistan, India, Egypt, Israel, Nigeria, the Gold Coast, as well as all European countries, just to mention a few. I know their reaction.

Now, there is a new force in the world and we must reckon with it. So many of us have been led to believe that the cold war was merely a struggle on the part of the Kremlin to make Communists out of Washington and that Washington was trying to make Capitalists out of the Kremlin.

No, no, that is not the cold war at all. We are both struggling for entirely different



MAJ. GEN. MELVIN J. MAAS, USMRC, RET.

things, and the same thing, this giant that is arising in the world today. The Asian and African after centuries of suppression is going to take his place in the world. He is going to have his full share of the good things on this earth, and he is a force to be reckoned with.

He is looking us both over now to see in which direction, Communism or Democracy, lies the best chance for him to achieve his aspirations, hopes and dreams. He hasn't yet made up his mind.

The best proof of that, and a very sinister warning to us, or a most hopeful invitation was the Bandoing Conference of the African-Asian world. The Communists thought gleefully that when they united at Bandoing and Indonesia they would suddenly rise against the white races of the Western World. It did not happen.

These colored people of the world, yellow, brown and black, were not as taken in by Communism as the Communists thought. Not that they fell into our laps, but they have given us a chance. If we fail, if we miss this, if we let them go to the Communists, it will have been a serious warning we failed to heed, and in that case our day is not long.

Because if the Communist world can absorb the colored races of the world, then the Western World, the democracies as we know them, are done. We are through. We will become a suppressed people.

But, on the other hand, this gorgeous opportunity that has been given to us, if we take full advantage of it; if we understand and extend the hand of fellowship, partnership to the African-Asian World, and if we can win them over, then it is Communism that, blocked off, will fall of its own weight because it will wither and die on the vine. That is the opportunity that has now been afforded to us. This giant of Asia-Africa is a force to be reckoned with, but he is open to convincing.

Now, the Communists are trying to capture his mind and we cannot match their great, though false and empty promises. But we can do, and must do in deeds what they are not doing and cannot do to counteract their promises, their false promises, and we have that opportunity.

We are trying to win the loyalty of their hearts and their minds. I want to tell you that I did not realize myself the importance of this work of rehabilitation and job placement until I talked with the delegates from these Asia and African countries.

I talked with intelligent yellow men, intelligent brown men, intelligent black men. Can any of you doubt, if they know the facts, if they have the truth, if they see the real picture they would not rather chose a system of social order, a political and economic system which is led by a personal God with a religion of love, kindness and forgiveness; a religion which sanctifies mankind and respects the dignity of every human being, as against a system built around that godless religion of Satan calling itself Communism, which debases mankind and enslaves the individual; where the individual is nothing and exists only to serve the state? In a democracy the individual is everything and the state exists to serve him.

Oh, if we could just get that across to the rest of the world, there can be no doubt in which direction this new giant will step. And

the happiest thing is, we are doing it probably without having realized it.

You know, we as a people are engaged in this great humanitarian work of rehabilitation, and of course, rehabilitation is a job. In fact, it is a cruel hoax on a man or woman to give them vocational training and train them for a job if there is no job opportunity there. It is a fraud on the taxpayers to do it.

So, when I talk about rehabilitation, I mean of course, the end result—a job. And that is the work the President's Committee has decreed, the atmosphere where there can be job opportunities.

I have had Asian, African and European delegates tell me that learning what we are doing about our handicapped was doing more to restore their faith in this country, doing more to counteract the Communist "hate America" campaign, than any other thing we were doing.

Because, what is it this Asian and African wants now that he is rising from his suppression? The Communists promise him more roads, automobiles, schools, hospitals, better clothing, more goods. Is that what he wants? Of course, but is that the real thirst in his mind? Is that what his heart is hungering for?

No. The real craving in the breast of the Asian and African is something entirely different. I know this from first-hand knowledge, from talking to hundreds of them. The real craving, the thing he wants above all else is to have his human dignity respected. Something that has not been done for a long time.

They have been treated as something far less than a second class citizen. They want equality. To them the badge of equality is respect for their dignity. They have told me. So many of them say, "General, you people in America must really be decent, kindly, generous people. You wouldn't do these things if you weren't."

When they learn of the President's Committee and of governor's committees made up of all great labor organizations, the great employer groups, the insurance companies, the veterans' organizations, women's clubs, the

medical profession and social workers, just dedicated men and women all volunteering themselves for this great work, then they know—and so many of them have told me—when they learn about this then they know that we are not the mercenary, money-grabbing, dollar crazy people that the Communists try to picture us.

It is opening a whole new world to them, because they understand the language of the handicapped. So many of their numbers in Asia and Africa are handicapped through malnutrition, ill housing, sickness and diseases, and traditionally nothing is done for their handicapped at all.

They are learning of something that is completely new to them. The idea that the handicapped can be rehabilitated and can be given jobs and be self-supporting, and can have their respect restored, is new to them.

So they say to me, "You in America, you really must respect the dignity of every human being. If you didn't you wouldn't do this for the most helpless of your citizens." They say, "you wouldn't take cripples—" because to them anybody that is handicapped is a cripple—they say, "You would not take your cripples and put so much time in giving them medical restoration to where they are only handicapped; give them rehabilitation; give them vocational training and finally get them jobs where they can earn their own living. If you do that, then it is true you really are fine people. You are decent people. You aren't what the Communists tell us you are at all. You are giving us the thing we want, a

chance to earn our self-respect and have everybody respect our dignity."

So in this work we are forging the most potent weapon in this cold war to win it. If we win the cold war there will never be a hot war. Because if we can win the Asian and the African to democracy and freedom, then gentlemen, the day is in sight within our sight, to achieve the most cherished dream and hope and ambition of mankind from the dawn of civilization—universal and lasting peace. Because if we can combine in partnership and can box off the Communists until their system has collapsed and they have been forced to accept the standards of the rest of the world, then we can have peace.

Now, in closing I just want to call this to your attention. The way to avoid a hot war and win the cold war, is to keep pouring water on this cold war to keep it from bursting into a hot war, and two most important faucets of pouring that water are:

1. To maintain our strength, military, economic, and, most precious resource of all, our manpower.

That is language the Communists understand and respect, and

2. To keep on demonstrating to the world that we honor above all else, the dignity of the human; that we are decent people; that under a democracy everyone has a chance to maintain his self-respect and that every human's dignity is respected.

If we keep pouring the water from these two faucets, I assure you that in the end some water will rust away the Iron Curtain.



"Labor to keep alive in your breast that little sparkle of celestial fire called conscience."

GEORGE WASHINGTON



# Man Must Breathe

By

CAPTAIN C. DAVIS BELCHER, MC, U. S. Naval Reserve†

**W**E LIVE on the surface of this planet hardly aware of our dependence on oxygen. Fly high in the sky, or dive beneath the ocean's surface and one quickly realizes his need for that gas. For lack of it the more sensitive tissues, such as the brain, die rapidly. By volume our atmosphere consists of: oxygen, 21%; nitrogen, 78%; argon, .94%; carbon dioxide, .04%; traces of helium, krypton, xenon, hydrogen, neon, and nitron; varying amounts of ammonia, ozone, and water vapor.

Heating of the atmosphere by the sun produces winds and rains which aid the natural tendency of gas molecules to diffuse. As a result the composition of the atmosphere is remarkably constant over the entire surface of the globe and at all altitudes except that some increase in ozone and ionized gases appears in the upper atmosphere.

Interference with our oxygen supply may result from a variety of causes. We will not discuss here organic diseases of the respiratory or circulatory systems, but will confine ourselves to situations arising from the presence or absence of specific chemical substances in the atmosphere.

With increasing altitude, the air becomes thin and respirations labored. Individuals adapt to high altitudes and live in such places as Chucuito at an elevation of about 13,000 feet in the Peruvian Andes. Shepherds, hunters, mountain climbers and others work at higher altitudes but such adaptation takes time. When changes in altitude occur suddenly, the unadapted individual without

supplementary oxygen may be in difficulty at such elevations, incapable of much effort at 20,000 feet and unconscious at 30,000 feet with death resulting if exposure is prolonged.

Three Frenchmen ascended in the balloon Zenith to a height of 28,000 feet on April 15, 1875, but only one survived. An Englishman, Glaisher, made a balloon ascent on September 5, 1862, to an estimated altitude of 37,000 feet. He became unconscious at 29,000 feet. A balloonist may become unconscious from oxygen lack or cold and subsequently recover if the balloon descends to a lower altitude before death overtakes him, but the pilot of heavier than air vessels is less apt to recover consciousness in time to regain control. The mental and physical effort required in airplanes restricts them for safe operation to much lower altitudes than would be the case with balloons if supplementary oxygen is not available.

Oxygen lack depends not only on the percentage of oxygen in the atmosphere, but also on the partial pressure exerted by the oxygen. At sea level the atmospheric pressure is 14.7 pounds per square inch. The partial pressure of the oxygen will be proportional to its percent by volume in the atmosphere, which is 21%. So we can state:

Partial pressure of oxygen equals the atmospheric pressure times percentage of oxygen or  $14.7 \times .21 = 3.14$  pounds per square inch at sea level. The atmospheric pressure and the partial pressure of oxygen decrease with increasing altitude as shown in Table 1. When the partial pressure of oxygen drops below 2.12 pounds per square inch the unadapted individual has difficulty thinking out and performing logical operations. When it drops below 1.25 pounds per square inch he is unconscious.

Early military pilots were picked men in excellent condition who withstood oxygen lack better than the average. Their aircraft

The opinions or assertions contained herein are the private ones of the author and are not to be construed as reflecting the views of the Navy Department or the naval service at large.

HONORABLE MENTION in the Sir Henry Wellcome Medal and Prize Essay Contest 1958.

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TABLE 1  
ATMOSPHERIC PRESSURE AND PARTIAL PRESSURE OF  
OXYGEN AT CERTAIN ALTITUDES

Altitude in feet above sea level	Atmospheric pressure pounds per square inch	Partial pressure oxygen pounds per square inch
0	14.7	3.14
2,000	13.6	2.86
5,000	12.2	2.56
10,000	10.1	2.12
20,000	6.76	1.42
30,000	4.35	.91
40,000	2.71	.57
50,000	1.69	.35
60,000	1.04	.22

were suitable for relatively low altitude flying with rare excursions for short periods to higher altitudes. A somewhat exaggerated concept of man's ability to withstand oxygen lack arose as a result. The advent of passenger and troop transportation at higher altitudes for longer flight times revealed that many individuals did not tolerate even mild anoxia. There developed at least some apprehension which was a deterrent to the ready acceptance of air transportation. This situation was clarified by experiments in low pressure chambers.

The use of tank or liquid oxygen proved effective in reducing anoxia but added weight to the aircraft and restrictive masks and connections to the personnel. While operating procedures vary a reasonable one is to take off on oxygen for flights at 8,000 feet which will exceed four hours, or 10,000 feet for two hours, or 12,000 feet for any time. Untrained individuals seeking rapid transportation were not cheered by the use of such appliances and commercial air transportation and to some extent the military turned to the development of pressurized cabins. These posed problems in fabrication and at first no effort was made to construct aircraft that maintained a sea level atmospheric pressure within the cabin at all altitudes but instead they endeavored to keep the pressure in the cabin just high enough to avoid the onset of uncomfortable symptoms while permitting the aircraft to fly at altitudes several thousand feet above the

equivalent altitude of the atmosphere within the cabin. The advantage here was the avoidance of the storms, winds, rains, clouds and ice that existed at lower altitudes.

Divers beneath the sea or men in deep tunnels must breathe air supplied at increased pressure to offset the pressure of the water around their bodies or threatening to gain entrance to the tunnel. The pressures corresponding to definite depths of sea water are given in Table 2.

The use of compressed air was found to be satisfactory to a depth of 200 feet. Beyond this point toxic symptoms appeared due to nitrogen poisoning. To prevent this complication, the inert gas helium was substituted for nitrogen and on helium oxygen mixtures divers attained depths on the order of 300 feet without ill effect. Beyond this point toxic symptoms again appeared which were found to be due to oxygen poisoning. The partial pressure of oxygen was so high that adverse physiological effects were produced. To dive further it became necessary to reduce the oxygen so that the partial pressure did not exceed 34 pounds per square inch. This was satisfactory to depths around 500 feet. At this point the volume percentage of oxygen in the helium oxygen mixture being breathed is only 14.3%, which provides limited contact with the lung surfaces and symptoms of oxygen lack may appear. A biological limit for the depths to which a man can dive exists, but as in mountain climbing individual factors enable some to tolerate situations impossible for others.

TABLE 2  
PRESSURE AND PARTIAL PRESSURE OF OXYGEN AND  
NITROGEN AT CERTAIN DEPTHS OF SEA WATER

Depth below water surface in feet	Combined atmospheric and water pressure in pounds per square inch	Partial Pressure Oxygen	Partial Pressure Nitrogen
0	14.7	3.14	11.5
200	103.7	21.78	81.0
400	192.7	40.47	150.0
600	281.7	59.16	220.0
800	370.7	77.85	289.0
1000	459.7	96.54	359.0

The gases of the atmosphere being breathed penetrate into the blood and tissues of the diver. Restoration to normal atmospheric pressure must be a gradual procedure to permit these gases to escape from the tissues and blood. If inadequate time is allowed gas bubbles form. This is called the bends or caisson disease. Diving vessels have decompression chambers in which the diver is placed if he has been surfaced rapidly and gradual decompression is carried out. If an accident necessitates a diver being surfaced rapidly from a great depth even the presence of a decompression chamber may not protect him from severe or fatal injury. In naval diving practices examples of the minimum time to be employed in surfacing a diver by stages when no decompression tanks are to be used is shown in Table 3.

The duration of the dive has a direct bearing on the tissue penetration of atmospheric gases and for longer working periods on the bottom the time required for decompression must be extended. In Table 3 a working period of about three hours was taken simply to show some comparative values for time on the bottom. Diving at great depths is time consuming and when the vagaries of wind and water are added to the biological requirements many man hours must be expended to produce a relatively small period for effective work on the ocean floor.

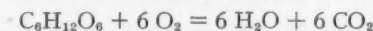
When an aviator ascends rapidly from the earth's surface he moves from an area of greater atmospheric pressure to one of lesser just as does the ocean diver coming up from the bottom and like the diver the aviator can get the bends. It is rare below 30,000 feet and

can be partially avoided by slower ascent or by breathing pure oxygen for an interval before starting the ascent.

People who went down into the bottom of deep wells, tanks, silos, caves or mines where the air had not been disturbed for some time occasionally died. On examination, the partial pressure of oxygen might be found to be reduced but still adequate for survival, but the amount of carbon dioxide present was greatly increased. This heavy gas settles in such spaces. A concentration of 10% carbon dioxide is poisonous and these people died of carbon dioxide poisoning despite the presence of adequate oxygen. A candle will burn in an atmosphere containing 12% carbon dioxide and adequate oxygen but a man will die in it.

There have been many deaths where solid carbon dioxide was used as a refrigerant and in aircraft and other spaces where carbon dioxide was used as a fire extinguisher. It is difficult to be sure of the cause of death in such cases as oxygen may be reduced at the same time carbon dioxide is increased. At this point it is enough to make it clear that carbon dioxide is by no means just a harmless byproduct of respiration. It is a lethal gas.

To clarify this, let us imagine a man in a sealed box having a volume of 200 cubic feet, filled with air at normal atmospheric pressure. 21% of this will be oxygen, and .04% carbon dioxide. Concerning ourselves simply with the problem of respiration, let us follow what happens to the atmosphere in the box and to the man. First, we must review briefly the basic cycle of oxygen and carbon in nature. Animals take in oxygen to combine with the carbon of their foodstuff along the general lines of the following equation:



The oxidation of a carbohydrate molecule containing six carbon atoms will require twelve atoms of oxygen and will produce six molecules of carbon dioxide which is exhaled to the atmosphere. We know that equal volumes of gases under the same conditions of temperature and pressure contain the same

TABLE 3

MINIMUM TIME FOR SURFACING DIVER WHEN  
DECOMPRESSION TANK IS NOT USED

Depth of dive in feet	Time in minutes from leaving surface to beginning of ascent	Minimum time coming up in minutes	Total time in hours
100	85	64	2.78
200	35	108	2.38
300	20	160	3.00

number of molecules, so for every cubic foot of oxygen consumed a cubic foot of carbon dioxide is produced.

At the end of 24 hours our man in the box will have used up 20 cubic feet of oxygen and produced 20 cubic feet of carbon dioxide. In a total volume of 200 cubic feet we have 10% carbon dioxide and 10% oxygen. This level of oxygen can support life but 10% carbon dioxide is fatal. Our man dies of poisoning—not lack of oxygen.

There is still sufficient oxygen left to support life and we can prolong his existence if we get rid of the carbon dioxide. An accepted solution is the use of absorbing material which we see applied in anesthesia machines, diving helmets, submarines, and similar situations. By such means we can keep our man alive until the oxygen is reduced to fatal levels, or improve his condition by adding oxygen.

Absorption depends on carbon dioxide combining with water to form carbonic acid:



Oxides, peroxides, and hydroxides of metals all absorb acidic gases such as sulphur dioxide, carbon dioxide, and hydrogen sulfide. Hydroxides are employed because of their greater stability and the ease with which they can be handled. The facility with which carbon dioxide is absorbed depends upon the position of the metal forming the hydroxide in the electromotive series. The order of activity of the alkali metals is as follows: caesium, rubidium, potassium, sodium, lithium.

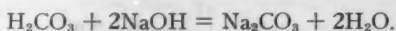
The alkali earth metals follow these in activity in this order: barium, strontium, calcium, magnesium.

The hydroxides of the alkali metals are very soluble in water and are highly ionized in aqueous solutions. In fact they have such an affinity for water that they abstract it from the air to form thick gelatinous solutions if allowed to stand exposed.

The hydroxides and oxides of metals other than the alkalis or alkali earths are either insoluble or so feebly basic that they are of little value for the absorption of feeble acidic gases, such as carbon dioxide. Ammonia

forms a weak base which is unstable and not at all suitable for practical use.

The reaction of absorption of carbon dioxide is one of neutralization, since carbon dioxide forms carbonic acid with the water in any space or rebreathing unit. A typical reaction would be as follows:



Potassium, sodium, and lithium carbonates are water soluble salts. Carbonates of the alkaline earth metals are insoluble. When the carbonate is soluble and an excess of carbonic acid is present it may react further with the carbonate to form bicarbonate. Sodium carbonate and carbonic acid react as follows to produce sodium bicarbonate:



To see what limitations are imposed in a realistic situation, take a crew of fifty on a 3,000 calorie carbohydrate diet. Each man requires 1.65 pounds of carbohydrate per day making a total of 82.5 pounds. Each man requires 1.7 pounds of oxygen per day, making a total of 85 pounds. Each man will produce 2.42 pounds of carbon dioxide, making a total of 126 pounds.

They use a greater weight of oxygen than of food, and produce a greater weight of carbon dioxide than the weight of oxygen consumed. In normal existence our main concern is food and we have no active interest in the quantities of oxygen or carbon dioxide involved in our metabolic processes. When we exist under circumstances where atmosphere must be controlled, all components entering into the metabolic cycle must be assayed in their factual role. We may set up a table showing what confronts us when we live in a closed space (Table 4). One standard oxygen tank weighing 150 pounds when filled with oxygen at 2,000 pounds per square inch pressure holds 20 pounds of oxygen. It takes 1.68 pounds of calcium hydroxide to absorb each pound of carbon dioxide.

The space and weight requirements for prolonged existence where the atmosphere must be controlled by the use of tank oxygen and carbon dioxide absorbents imposes defi-

TABLE 4  
REQUIREMENTS FOR CREW OF 50 IN CLOSED SPACE

Number of days	Pounds oxygen	Weight with tanks	CO <sub>2</sub> Pounds produced	Pounds carbon dioxide absorbent
1	85	635	126	212
7	595	4,450	882	1,480
14	1,190	8,900	1,764	4,968
30	2,550	19,050	3,780	6,360

Number of weeks	Tons oxygen	Tons weight oxygen and tanks	Tons CO <sub>2</sub> produced	Tons carbon dioxide absorbent
10	3	22.2	5	7.5
50	15	111.0	50	37.5

nite restrictions on their use. In the case of submarines surfacing or snorkelling to dispose of carbon dioxide and obtain fresh air is a highly economical procedure which the technical aspects of submarine warfare are making more hazardous to employ.

One problem is keeping the hull carbon dioxide low. All absorption is to some degree dependent on the concentration of carbon dioxide and as this rises the procedure becomes more effective. A point is finally reached where carbon dioxide is absorbed as fast as it is formed but the hull carbon dioxide level may come up to 2 or 3% before an equilibrium is reached.

For submarines on long cruises it is possible to refill empty oxygen tanks or other storage vessels with compressed air during periods of surfacing or snorkelling. However, when such air is released within the hull it will cause an increase of the atmospheric pressure unless an equal amount of hull air is pumped overboard. If operating conditions prohibit discharging air outboard with the associated noise of pumps and the presence of surface bubbles such an increase of pressure will inevitably occur. The pressure factor may present no problem but as more and more air is released and the oxygen in it is converted to carbon dioxide which in turn is absorbed, the percentage of nitrogen in the atmosphere will increase.

The presence of nitrogen in our atmosphere in a concentration of 78% is a matter

to which we ordinarily pay no concern although we have already mentioned certain hazards which arise in diving to great depths. Under the conditions existing with a closed atmosphere it becomes of primary concern. When we add air the nitrogen remains and as this increases in percentage we reach a point where the addition of air to the space will not produce an atmosphere with sufficient oxygen to maintain life. It is obvious that the proportion of nitrogen, or any metabolically inert gas substituted for it, must be, in any closed system, maintained within acceptable limits of its natural proportion in the atmosphere. This may require considerable engineering ingenuity. The use of compressed air within a submarine or other closed space without blowoff from the hull would be quite acceptable for limited periods as the range of human adaptation is large. When such air is employed the pressure within the hull must be equalized with atmospheric pressure when surfacing to avoid accidents.

In pressurized aircraft at high altitudes the maintenance of satisfactory atmospheric conditions within the cabin requires that cabin air be discharged outboard in order to reduce the carbon dioxide content with a reduction in undesirable odors resulting as a secondary gain although not always a vital one.

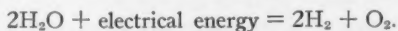
If for any reason outboard discharge is interfered with and inboard pumping ceases the carbon dioxide level will rise and the



time required to reach fatal levels will depend on the volume of air available in the fuselage for each individual. Adding oxygen from emergency tanks will be of little avail. If inboard pumping continues while outboard discharge is still not functioning this will increase the pressure within the fuselage and reduce the volume of carbon dioxide. However, the toxicity of carbon dioxide is dependent on its partial pressure and as the atmospheric pressure is increased the volume percentage required to produce narcosis decrease. The diving helmets of deep sea divers contain carbon dioxide absorbent to prevent carbon dioxide narcosis from the relatively high partial pressures that can occur when even small amounts of carbon dioxide accumulate in the suit, helmet, and air hoses. The recognition of dangerous levels of carbon dioxide can be just as important in such aircraft as it is within submarines.

In a submarine or space vehicle with no outside atmosphere available for replenishment it might become necessary to pump outboard the contained atmosphere if it became contaminated with noxious fumes as the result of fire or other untoward event. If this should occur, some inert gas such as nitrogen or helium or compressed air must be available to permit restoration of a normal atmosphere. Oxygen alone would present a fire and explosion hazard aside from any biological complications that might result from prolonged existence under such conditions if the atmosphere were maintained at sea level pressure.

The transportation of tank oxygen imposes a burden that becomes prohibitive. We must consider other means and one is electrolysis. The electrolytic dissociation of water to form oxygen can be represented by this equation:



Each man would require 1.7 pounds of oxygen per day which will require 4,000 watt hours per day to produce it. For a crew of 50 the total power would be 200 kilowatt hours per day. If consumed continuously over a period of 24 hours that would require power at the rate of 8.3 kilowatts. This is

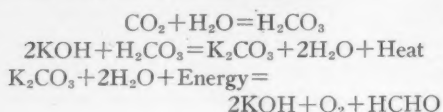
not prohibitive. With conventional diesel submarines electrolysis offered little help because the oxygen produced would either have to be stored if generated while surfaced or would require the use of batteries to run the electrolytic apparatus while submerged. Such a system would require frequent surfacing or snorkelling to keep the batteries charged.

With atomic power, however, no ordinary fuel oxidation takes place, as the plant operates on a closed circuit without using oxygen or producing exhaust fumes. Power is present in abundance without great increase in weight for the amount of additional fuel required. An increase in power consumption of the amounts necessary to produce oxygen by electrolysis and operate necessary auxiliary equipment offers no great problem when a few pounds of additional reactor fuel would suffice for a year. With adequate fresh water available from storage tanks or distilling apparatus and adequate electrical power, the production of oxygen by this means is certainly feasible. As formed by electrolysis, hydrogen and oxygen are present in explosive proportions. We have the problem of keeping the hydrogen content at safe levels and disposing of the hydrogen produced either by pumping it outboard or into tanks for later disposition depending on conditions. It cannot be burned for to do so would require all the oxygen produced by electrolysis. If it is stored for long periods of submersion we again encounter the necessity for storage tanks. The desirable thing is to pump it outboard devising some procedure for dissolving it in sea water so that no perceptible surface bubbling, foaming or discoloration occurs.

With oxygen by electrolysis the limitations attendant on the use of heavy high pressure cylinders is avoided. In addition, if this solution is satisfactory it remains so indefinitely.

A neat electrolytic system for oxygen combined with the use of bulk absorbents for carbon dioxide is incongruous. Desirable is something that will take care of both oxygen production and carbon dioxide removal continuously and be reasonably simple in design. Reactions along the following pattern, al-

though they would probably give a professional chemist nightmares, will at least show what the general scheme might be.



In this series of reactions carbon dioxide combines with water to form carbonic acid which in turn reacts with potassium hydroxide to form potassium carbonate in the manner common to all conventional carbon dioxide absorption systems. Potassium carbonate is highly soluble. The third step is the reduction of the carbonate back to the hydroxide with release of oxygen and formation of a simple carbon compound, in this case formaldehyde. The reformed hydroxide continues to react with the carbonic acid to produce more carbonate, assuring continuity of the procedure. However, formaldehyde, HCHO, is a liquid which boils at  $-21$  degrees centigrade, so for all practical purposes it would be a gas. It is toxic and would be harmful in the atmosphere. With a proper catalyst to accelerate solubility it might be kept in solution until more elaborate reactions take place resulting in a hydrocarbon that is not volatile and which could be discharged outboard. The Aldol reaction, where aldehydes undergo condensation in dilute aqueous solution would serve as an example of possible paths along this line.

Other methods offer possibilities. The selective removal of the carbon dioxide molecule from the atmosphere by diffusion techniques would permit its being pumped outboard or stored. Electrical or catalytic means to combine it with sea water would permit outboard discharge where bubbling should be avoided.

For use in a closed space it is most desirable that all the contained air be put through a single apparatus which would remove particulate matter, materials causing unpleasant odors or possessing toxic qualities, and excess carbon dioxide, replace oxygen and finally wash and dry it to the desired level of humidity. In some instances it might be found de-

sirable to add certain odors to produce an agreeable environmental change. If such an apparatus were reasonably efficient it would permit very prolonged existence, in fact other factors could prove to be the limiting ones.

Aviators taking oxygen by mask at high altitudes may be exposed to the hazard of carbon dioxide lack. With increasing altitude the partial pressure of carbon dioxide falls. The normal pressure of carbon dioxide in the blood stream controls vital respiratory and cardiac functions. A fall in the partial pressure of carbon dioxide produces the same effect as hyperventilation, namely alkalosis. Their breathing apparatus must be so designed that the partial pressure of carbon dioxide remains close to that existing at the earth's surface.

At high altitudes the aviators atmosphere within his mask will be made up of water vapor, carbon dioxide, and oxygen. Using 100% tank oxygen he can maintain normal oxygen pressure to 34,000 feet. Beyond that altitude the water vapor and carbon dioxide cannot be reduced so the effective pressure of oxygen is reduced resulting in unconsciousness around 38,000 feet. Flights have been made above this altitude for short periods using such equipment by selection of pilots with wide tolerances.

Sustained flights at higher altitudes is accomplished by pressurized cabins, or the use of pressure breathing apparatus and pressure suits that keep the flyer wrapped in a protective sheath and atmosphere regardless of conditions in space. Such suits can be life saving in the event of sudden loss of cabin pressure or by themselves alone can make possible flights to altitudes that would otherwise be impossible. Watching men in such flying gear one notes the similarity with the deep sea diver dropping beneath the surface of the sea. They get a little working time in a hostile environment that would otherwise be impossible. You might circle the moon in such an outfit, a few days of highly restrictive and uncomfortable existence could be tolerated.

Such flight suits can supply heat as does

TABLE 5  
DAYS REQUIRED AT SPECIFIED SPEEDS FOR TRIPS TO PLANETS

Planet	Closest distance to earth in miles	Days required for round trip at following speeds		
		50,000 mph	100,000 mph	250,000 mph
Venus	24,500,000	39	19.5	7.8
Mars	34,600,000	52.7	28.9	10.5
Mercury	50,900,000	84.5	42.5	17.0
Jupiter	367,200,000	614.0	307.0	123.0
Saturn	745,000,000	1,236.0	618.0	247.0
Uranus	1,607,300,000	2,660.0	1,330.0	532.0
Neptune	2,675,000,000	4,440.0	2,220.0	888.0
Pluto	2,700,000,000	4,460.0	2,230.0	892.0

the electrically heated underwear of the deep sea diver and arranged to permit some mobility and freedom to work, would be essential for effecting repairs in a compartment of a space ship which had been holed by a meteorite.

Above 80,000 feet the atmosphere is so thin and the ozone content so high that in-board pumping must be abandoned and reliance placed on gases carried within the aircraft.

We have two possible approaches to space, one to inclose the personnel in restrictive suits, helmets, and so forth with maximum protection and the other trusting to luck to a greater degree but essentially depending on pressurized cabins and leaving the individual free.

What do we mean when we say space travel? In the past almost anything could be so regarded because the chances of realization seemed slim. We think this has changed. Although we are still limited simply to improved aircraft or balloons for deeper penetration by men into the atmospheric heights around us we have witnessed objects of varying size going into orbit as earth satellites.

When Sputnik I went into orbit all the super science, astounding and amazing fiction stories of the last century rose up to shout, "I told you so." Public reactions vary from die hards who don't believe to the gullible buying lunar real estate and planetary concessions. For most of us it meant the end of a glamorous era in scientific fiction. The impossible was happening again. When will

man actually travel from this planet to another planet? No one really knows. How long would such trips be is a very reasonable question. See Table 5. To say the least, this table is very rough. The planets do not occupy fixed places comparable to Chicago and San Francisco, but are moving at high velocities in their own orbits. If a space ship departed from Earth when the target planet was closest to it that situation would not obtain when the space ship arrived there. On the other hand, if a space ship departed so as to intercept the target planet when it was closest it would have to leave when the distance was considerably greater. Having arrived it might then be impossible to return at once, as the distances might have become too great and it might be necessary to wait until the planets were again approaching each other to make the return trip. The lay-over period could well exceed the time in flight. These problems all revolve about the problem of velocity—how fast will a space ship go?

When we talk in terms of weeks, months, or years in flight that means freedom to move about, maintain equipment, and take care of oneself. Such requirements imply an airtight space ship capable of carrying its own self contained atmosphere together with the apparatus necessary for its maintenance. We will have to decide what atmospheric pressure we intend to maintain within our space ship, as that will determine in part the weight of the vessel needed to contain such an atmosphere.

In true space the external atmospheric

pressure will be zero and the internal pressure will tend to disrupt the structure. The stress in the envelope of a spherical space ship increases in linear fashion with increasing diameter and also increases in linear fashion with pressure within the envelope. But inasmuch as the tensile strength of aluminum alloys may run as high as 30,000 pounds per square inch, it is obvious that even a 50-foot sphere would require a wall thickness of only a small fraction of an inch to withstand the disrupting force due to the pressure of the contained atmosphere. It is possible that a greater thickness would be required to withstand deforming forces inherent in maintaining shape, supporting internal apparatus and withstanding launching or assembly. A double hull may be necessary so that small meteorites would expend their force there. Insulation might be required. Access to all areas of the hull for prompt repair in the event of holing by a meteorite would be essential, as well as self sealing to at least limit loss of atmosphere from such an event.

Such loss of atmosphere due to hull penetration, broken windows, door failures or other causes is a real hazard at high altitudes. Unconsciousness follows in a matter of a minute or two. Emergency oxygen must be available for pilots to enable them to bring the aircraft to lower altitudes and for crew members to effect repairs. At 63,000 feet the atmospheric pressure is so low it equals the vapor pressure in the lungs and the blood can literally boil. Explosive decompression of the cabin under such conditions would be fatal unless the individual is protected by a pressure suit. It may be necessary to maintain airtight compartments, possibly with duplicate control areas, so that all personnel could not be simultaneously exposed to explosive decompression. In such protected spaces pressure suits could be put on and through air locks access could be had to the decompressed areas so that repairs could be effected. There are many points of similarity with diving.

There are two main problems—food and oxygen. We raise food on Earth either as

plants or animals which are fed on plants. They all represent carbon compounds. For the sake of discussion let us decide that the time of flight we wish to consider is such that we can no longer throw away carbon or much of anything else. We must recycle all the molecules we take with us so that the carbon again becomes available for food, the oxygen to breath and the water to drink. On earth this occurs simply as a result of photosynthesis—taking place in all the many forms of plant life. Somehow in our space ship we must accomplish the same thing. Can we do it with plants, or a chemical substitute or some entirely new means?

In the usual discussion of photosynthesis one sees how relatively simple carbohydrates are made by plant chemistry. We might someday imitate this using Chlorophyll from living plants or some synthetic substitute and by means of a controlled reaction produce some such carbohydrate as sugar. It might be feasible to install some such apparatus in a space ship. But who can live on sugar? While we process beets just for sugar we do so because we have other sources from which to obtain the proteins, vitamins, and minerals essential for health. Simple plants are able to produce a wide variety of carbohydrates, proteins, vitamins, and minerals. One can live on plants. One cannot live on carbohydrates. Despite the prodigious advances of modern chemistry one sees no sign on the horizon of large scale factory duplication of the total photosynthetic reaction occurring in plants on any wide scale. Simple carbohydrates perhaps; proteins, and vitamins, no.

To convert carbon dioxide into edible food is commonly accomplished over a period of several weeks to produce the plants ordinarily eaten by us. More time is required if this material is to be further processed by feeding to livestock. A space ship large enough to provide the equivalent of pasture and farmland for the production of conventional foods may some day exist, for when man first rigged sail on a canoe the *USS Constitution* became possible and when James Watts started pumping water out of a coal mine the *USS Saratoga* was born. The future

will have its own wonders to reveal, and they will stagger our earthbound imaginations. But we must learn to walk a step at a time and the smaller ships we can envisage at present offer us no such scope and some much more primitive form of plant life must be employed that will take up carbon dioxide and release oxygen very efficiently with the carbon becoming part of the growing plant which will in turn be eaten. Complex plants and animals have considerable waste material, such as inedible stalks, leaves, roots, stems, or flowers; hooves, horns, or bones as well as hides and feathers; and all these products consume some of our limited carbon and oxygen as well as other elements.

Facing this problem compels us to leave the conventional vegetables and fruits of our daily diet and explore the water-borne plant life called algae, where we might hope to find a satisfactory answer.

There are over 40,000 species of algae. They have been grown in pure culture in flasks, open tanks, and long tubes. They have been tested in a wide variety of culture media and atmospheres with varying percentages of carbon dioxide. Sunlight, and both incandescent and fluorescent artificial light have been used. The natural day-night cycle of sunlight as well as a wide variety of artificially imposed light and dark cycles have been tried.

Obviously the ideal answer would be a culture of algae to which we could supply all fecal and urinary waste, all condensed fluids collected from the bilges, and all suspended material washed from the air together with the exhaled carbon dioxide and other gaseous products and have the algae employ this material as a satisfactory food giving us back edible algae, fresh oxygen and potable drinking water. This must happen quite rapidly because if there is delay the plant will increase in size. On a slow scale this procedure goes on in nature constantly; if there is too little or too much, if the reaction is slowed or accelerated, it does not make too much difference. But in a space ship we cannot be so charitable. Week after week our limited supply of air will be washed

through the culture for carbon dioxide, noxious vapors and suspended particles to be removed and back must come fresh-smelling air of normal composition. At regular intervals a portion of the algae would be harvested and water would be removed to be processed for drinking. Can we do it? Can we depend upon any man-made arrangement to carry out these procedures? Will the algae be edible? Can human wastes be made into a food for algae?

We may have to accept compromises. If we can recycle carbon dioxide to get oxygen and some usable food and if we can reprocess wastes to get back water, we will reduce the weight of things to be carried and extend our flight possibilities and yet avoid the technical problems involved in total dependence on recycling. If we can attain a sufficiently high velocity in space effective space travel might be undertaken with such limitations.

The algae require, cobalt, low calcium, and the absence of boron in the culture media but otherwise their needs resemble higher plants. When cultured, it is difficult to keep the various elements in solution and chelating agents are used to prevent precipitation. The cultures may become contaminated with other microorganisms resulting in impairment or destruction. To prevent this, chemicals are added which will retard such contamination but do not interfere with growth of the algae. As algae cultures grow old they may produce substances which inhibit further growth. It is essential to recycle the culture media so the accumulation of such compounds would present a serious problem. Nothing must impair the edibility of the algae. Out of the many thousands of species of algae it is hoped that some can be found in which these problems are easily and safely handled.

The problem of setting up a world in miniature involving plant and animal life capable of being kept in continuous operation for many months from which all food and oxygen would come and back into which all feces, urine, sweat, and exhaled water would have to go involves many considerations outside the scope of this article which is devoted to the fact that man must breathe.



But these matters are pertinent because from the esthetic point of view early space travelers will doubtless find their environment somewhat less than ideal. It must still be livable.

Could an algal system be constructed that would maintain a suitable atmosphere for a small crew without imposing space and weight requirements that would be prohibitive? Would such a system have to be installed in duplicate, at least in part, so that if accident, failure or contamination compelled shut down for repairs or cleaning the other could carry on? Could two systems be kept in existence each operating at half load but either able to carry the full load in the event one was shut down? Can we use sunlight, passed if necessary by mirrors, lenses and filters to keep out undesirable radiations or would artificial light be essential? Following separation of the algae from the culture it must be dried and subsequently made up into palatable food stuff. Can this be done in so many varied forms that it can be the sole source of food? Or will it be necessary to provide space for raising some rapidly growing fish or poultry which can be fed with algae, and vegetables for which residues from the cultures, the poultry and fish can be used as fertilizers. This is very involved but there are really only two alternatives. You carry your food or you raise it and if grown it will be along some such lines, and the system must be so designed that the amount of absolute waste produced that cannot be recycled is an absolute minimum.

If man could live on algae it would be possible to supply a diet of 2,500 to 3,000 calories with one pound of dried algae per day. So far it must be admitted it serves as an occasional dish, soups can be prepared, it can be used for flavoring, it can be added as a supplement in the preparation of ordinary foods with benefit and without ill effect but there must be considerable increase in our knowledge of methods of using it and perhaps a long period of conditioning to make it satisfactory as a sole food supply for prolonged periods. For the really long haul no

large number of the atoms present at the time of departure could ever be discharged outboard or allowed to accumulate in useless waste. A few vital reserves of seed, algal cultures and specially treated fish and poultry eggs together with the necessary sperm would have to be held out in hopes they would survive if some disaster overtook the functioning cycle and permit reestablishment but for the rest it would be a very tight little world indeed.

A reasonable assumption for water intake is 1cc for each calorie in the diet. In the ordinary mixed diet one can assume that  $\frac{2}{3}$  of this water is contained in the diet and only  $\frac{1}{3}$  need be added. This assumption is not valid when dealing with dehydrated foods where the water must be restored either before eating or afterwards. The excretion of water is carried out by the kidneys, lungs, skin and feces, and the ratio usually accepted is 6-2-2-1 in the order named. For a 3,000 calorie diet of dehydrated algae an intake of 3,000 cc of water will be required and this will be excreted in the amounts: kidney, 1,630 cc.; skin, 545 cc.; lungs, 545 cc.; feces, 272 cc.

The respiratory quotient for a man is 1 only on a carbohydrate diet. Actually it is about 0.8 on a diet containing carbohydrate, protein and fat. Since photosynthesizing algae produce protein and fats as well as carbohydrates the photosynthetic gas exchange ratio or  $\text{CO}_2/\text{O}_2$  also differs from one and can vary from 0.7 to 0.9 depending on what is used as a nitrogen source. The gas exchange ratio of algae can be made to just balance that of man by controlling the culture medium. Let us assume a crew of ten men in a space ship and see what we have (Table 6).

Based on the daily data given above for 10 men let us visualize an algal culture system that will meet its needs.

A man requires 25 liters of oxygen per hour. Some algae can readily produce 25 liters of oxygen per hour per kilogram of wet algae. An effective circuit will handle a 1% suspension of algal cells which means

TABLE 6  
DAILY DATA FOR MEN IN SPACE SHIP

	Daily Data for One Man	Daily Data for Ten Man
Diet	3000 Calories	
RQ	P 70 F 67 C 530 grams	
	.86	
Weight Dried Algae	1.1 pounds	11 pounds
Weight Oxygen	1.7 pounds	17 pounds
Weight Water	6.6 pounds	66 pounds
Carbon Dioxide Produced	2.03 pounds	20.3 pounds
Feces	.6 pounds water	6 pounds
	.2 pounds solids	2 pounds
Urine	3.58 pounds water	35.8 pounds
	.328 pounds solids	3.28 pounds
Exhaled Water and Perspiration	2.4 pounds	24 pounds

100 liters of culture media per man. These are experimental figures and other strains of algae may give improved results but we can employ these to work out some approximate data.

The 20.3 pounds of carbon dioxide produced contains 5.56 pounds of carbon. If the culture is adjusted so that the respiratory quotient is equal to that of the men then we also recover the same weight of oxygen that went into the men to create the carbon dioxide and waste products. All of this oxygen is not contained in the carbon dioxide, part is in the urinary and fecal wastes and must be recovered from them by the algae. It is apparent that if a given weight of algae in culture is capable of releasing oxygen at a certain rate it must also be able to take up carbon from carbon dioxide at an exactly proportioned rate and create a corresponding weight of algae. So the algal system can balance the human insofar as oxygen production, carbon dioxide disposal and food production are concerned (Table 7).

When we start talking about space and power requirements for such a system we really do a lot of guessing. Depending on the exact arrangement of our final plant power could be used in the following ways:

1. To provide artificial light for culture growth.
2. To create turbulence by agitating, pumping, shaking, rotating, or stirring the culture.
3. Pumping algae and media from the main cul-

ture to ripening tanks or from the latter to the harvesting centrifuge.

4. Centrifuge for drying algae.
5. Electric ovens to dehydrate algae.
6. Refrigeration units for cooling culture if necessary and to be used in processing urine or feces if desired, or to cool air coming to or leaving culture as may be indicated.
7. Heating units to keep cultures and auxiliary apparatus warm if necessary, and to heat air entering or leaving culture if indicated.
8. Electric stills for obtaining drinking water from culture fluid.
9. Power for control board with flow meters, temperature indicators, automatic controls and alarm system.
10. Air pumps for circulating the cabin air through the culture.
11. Air scrubbers to clean air as it comes from the culture tank to remove any particular matter.

Only a closed system is feasible for space ship operation as the culture must be confined. Plastic tubing seems ideal but in pilot plant tests it tended to become brittle and develop leaks. In addition algal cells tended to adhere to the plastic surfaces cutting down the transmission of light. Our chief concern in this discussion is the maintenance of a satisfactory atmosphere. In using an algal culture to solve the oxygen and carbon dioxide problems under conditions of space flight we are brought up against the necessity for restoring the carbon as edible food. Either the solution does both or we must do

TABLE 7  
ALGAL PLANT TO MEET ABOVE NEEDS

		Pounds
Oxygen needed		17
Carbon dioxide available		20.3
RQ of culture		.86
Equivalent dry weight of algae		22
in culture to produce required oxygen		
Weight of culture media if 1% solution used		2200
Water into culture		
From feces	6.2	
From urine	35.8	
From exhaled water and perspiration	24.0	
Total		66.0
Water out of culture by distillation		66
Solids into culture		
From feces	2.0	
From urine	3.28	
Total		5.28
Increase in weight of algae in 24 hours		
if all carbon and added solids used		
Carbon from carbon dioxide	5.56	
Solids from feces	2.0	
Solids from urine	3.28	
Total		10.84
Planned yield		11

it some other way. It is apparent that on a simple basis of protein, carbohydrate, fat and calories an algal culture will solve the food problem but this may be more apparent than real. To produce a satisfactory long term diet from an algal culture tank presents problems.

To operate along the lines suggested would probably require energy at the rate of 4 to 10 horsepower per man. Let us say 7 horsepower per man giving us a total of 70 horsepower for ten men. This represents a continuous consumption of electrical energy at the rate of 52 kilowatts.

The only kinds of power that can be visualized in a space ship is something that does not require oxygen, such as an atomic reactor or solar energy derived by means of boilers, photocells, thermo-couples, special batteries or whatever. If we can create a space ship with an atomic reactor installed the problem of power for algal cultures such

as those discussed here becomes insignificant. The added fuel required would be of no consequence. With abundant power and weight secondary the culture apparatus can be built along excellent mechanical and electrical lines. But if there is some delay in putting atomic reactors into space it may be that we will have to run our plants from some form of solar power. Highly efficient means for converting solar energy to electrical energy in large quantities need improvement. Lacking any excess of power it would be necessary to design our culture system along lines that will take maximum advantage of sunlight, normal convection and conduction and reduce to a minimum the electrical energy necessary for operation.

It is impossible to believe that a finished space ship will be assembled and depart in accordance with initial plans. Revised Algal Culture System No. 3 will be pulled out as were its predecessors to be replaced by

RACS No. 4. The special aquariums for raising certain rapidly growing fish, shellfish or other sea life, the special coops for similar poultry, and the ultrascientific greenhouse for production of a few special vegetables to provide some dietary variety will undergo similar modifications. The dream ship will develop bulges and appurtenances far removed from the original stylized concept.

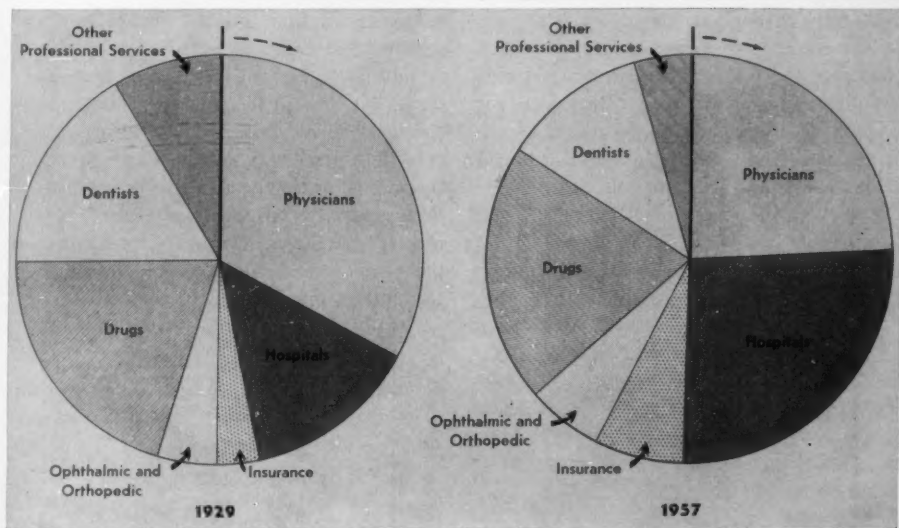
When the first doughty pioneers blast off into the wild blue yonder their space ship is likely to be a modern version of the Conestoga wagon of our ancestors and will seem as quaint to our grandchildren. Anything that anyone has deemed indispensable will be hung on somewhere.

But unless some completely impenetrable biological barrier exists in space they will conquer it. As she barrels along pushing up to 250,000 miles an hour the last few molecules of champagne clinging to her bow will boil away while within the hull a stable, liveable atmosphere will be maintained.

For whether on mountain top or ocean floor or swinging wide in orbit to take a final fix to drop down onto Jupiter we, as military physicians are well aware that man must breathe and all the complex hardware that exists or comes into being to assure that he does so has been in the past, is now, and will continue in the future to be our very proper concern.



COMPOSITION OF THE MEDICAL CARE DOLLAR  
(Personal consumption expenditures)



Health Information Foundation

(1947-49 = 100)

1929—\$32 per capita

1957—\$64 per capita

# Spontaneous Pneumothorax—Modern Concepts in Etiology and Treatment of an Important Syndrome in Military Practice

By

CAPTAIN PAUL A. THOMAS, MC, U. S. ARMY\*

(With six illustrations)

THE incidence of "simple, benign, non-tuberculous or idiopathic" spontaneous pneumothorax appears to be increasing. The number of patients admitted to this hospital each year for treatment of spontaneous pneumothorax has risen precipitously from 4 to 11 in the years 1948 through 1953 to 47 in 1956 (Fig. 1). A corresponding increase in the admission rate of patients with spontaneous pneumothorax per 10,000 admissions per year from 4.4 in 1953 to 17.4 in 1956 was noted (Fig. 2). Whether the experience at this institution reflects an increasing prevalence of this entity throughout the military service, or the country at large, cannot be stated. However, the current literature would tend to indicate a general trend of less striking

degree. This disease predominates among young men of military age, although it occurs occasionally in women as well as in children and older aged individuals. Therefore, the morbidity associated with this benign entity, computed in terms of hospitalization and loss of effective service military-wide, is of major concern. This becomes increasingly important in times of emergency when all available manpower must be mobilized and utilized to the fullest possible extent.

In the past nine years, from July 1948 to July 1957, 156 patients have been treated for 184 acute episodes of spontaneous pneumothorax at this hospital. From this experience several technical advances in therapy have evolved which may prove particularly useful in the practice of field medicine as well as hospital practice in smaller communities. These along with other observations of importance are combined in this report of our total experience which includes the diagnosis and treatment of both the acute episode and the complications of this interesting disease.

The opinions expressed in this paper are those of the author and do not necessarily reflect those of the Surgeon General of the Army, the Department of the Army, or the Department of Defense.

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FIG. 1. Spontaneous pneumothorax—admissions per annum.

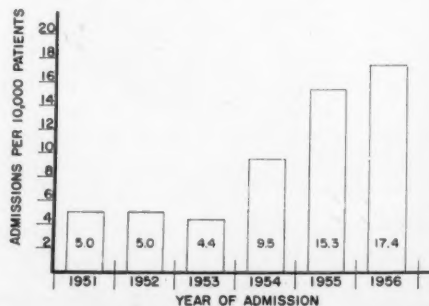


FIG. 2. Admissions for spontaneous pneumothorax per 10,000 admissions to hospital per annum.



## HISTORICAL

An interesting and detailed review of the subject of pneumothorax prior to 1903 was recorded by Emerson.<sup>1</sup> Some of the observations recorded up to the date of his writing are worthy of repetition. The "Hippocratic Succussion," or audible splash of fluid within a pneumothorax space was the first physical sign described. Combolusier, in 1747, gave a remarkable account of the pathologic physiology of spontaneous pneumothorax. He is quoted by Emerson as having said:

"Hence the air enclosed in the right lung was rarified by the warmth (of the body) burst its walls . . . into the cavity of the thorax and there expanding . . . compressed the lung, and prevented the circulation of the blood as well as of the air, which caused the feeling of anxiety, the difficulty of respiration, the frequent pulse and finally suffocation with the death. . . . It is, rather, clear . . . that the expanding air between the pleura and the lung, far from aiding respiration, placed there an obstacle by compressing the lung."<sup>1</sup>

Twenty years later Hewson recognized the presence of air in the pleural space clinically and described the operation, paracentesis thoracis, for relief of the condition. Itard, in 1803, coined the term, "pneumothorax," and Laennec, in 1819, brought this entity within the scope of clinical diagnostics by the development of the stethoscope. Devilliers, in 1826, was perhaps the first to describe spontaneous pneumothorax resulting from the rupture of an emphysematous bleb of the lung surface. Others investigated pleural pressure changes, pleural gas analysis as well as improved methods of diagnosis and treatment. Since 1903 the major contributions to our knowledge of pneumothorax have been refinements in understanding the pathophysiology and improved methods of therapy. Further, the recent rapid development of thoracic surgery has opened new avenues of consideration regarding etiologic factors responsible for the development of spontaneous pneumothorax in many cases.

## ETIOLOGY

Devilliers' description of pneumothorax resulting from a ruptured emphysematous bleb was given little attention by contemporary investigators. However, the development of pneumothorax in a patient with pulmonary tuberculosis, as reported by MacDowell in 1856, was received enthusiastically. Pneumothorax was accepted as a complication in 1 to 5 per cent of patients with pulmonary tuberculosis. Emerson<sup>1</sup> also believed that pulmonary tuberculosis was the leading etiologic factor responsible for the development of pneumothorax in over 60 per cent of cases. Idiopathic spontaneous pneumothorax in young men was thought to be infrequent and represented only 2 or 3 per cent of the total group. The medical profession relaxed, secure and content, with these concepts for a number of years. This peace was disturbed in 1932 by Kjaergaard who reported that the incidence of tuberculosis in a series of patients with spontaneous pneumothorax was no greater than that found in the population at large. This important observation was subsequently confirmed by numerous investigators. In a recently reported series of cases only 41 of 115 patients with spontaneous pneumothorax were found to have a positive tuberculin skin test.<sup>2</sup>

Recent studies indicate that spontaneous pneumothorax is not idiopathic in a strict sense. Observations based on radiographic findings, thoracoscopic visualization, and gross pathologic changes noted at thoracotomy revealed a high incidence of lung surface blebs and bullae in these patients.<sup>3,4,5,6</sup> Brewer and co-workers<sup>7</sup> suggested that the thin-walled, subpleural cystic lesions responsible for spontaneous pneumothorax be classified as either congenital cysts or acquired blebs or bullae. He further divided the acquired lesions into those cases of anatomical localization as opposed to those which are part of a more generalized pulmonary emphysema. Moxon<sup>8</sup> proposed a theoretical explanation for the pathogenesis of blebs and bullae over the apex of the lungs based on fluoroscopic observations. He demonstrated a

disproportionate overventilation of the lung apices during expiration against a closed glottis (Valsalva maneuver) which if repeated could rupture the subpleural alveoli resulting in bleb formation. Other factors have been incriminated and assigned varying degrees of significance such as bronchospasm, subclinical respiratory infection and sudden elevation of intrabronchial pressure with subsequent air dissection along vascular sheaths.

In our experience at thoracotomy, multiple blebs and bullae of the lung surface were found in 15 of 19 surgical procedures for spontaneous pneumothorax. In five instances the cystic pulmonary lesions were of sufficient size as to be detectable roentgenographically prior to operation. This has been utilized as one of the several criteria of case selection when advising thoracotomy. Other gross pathologic findings frequently associated with blebs and bullae are loss of elasticity of the lung, parchment-like texture and numerous adhesions. These are all changes suggestive of a fibrotic degeneration of the lung, the result of a pulmonary vascular insufficiency. Further, they are most often present in the region of the apices frequently sparing the entire lower lobe surface. This also suggests a vascular ischemia in the region of most severe change. Therefore, we subscribe to the thought that the blebs and bullae of the lung which rupture to produce the clinical picture of spontaneous pneumothorax are secondary to an underlying peripheral pulmonary vascular ischemia.

#### INCIDENCE

Prior to the advent of modern thoracic surgical techniques, spontaneous or idiopathic pneumothorax was defined as pneumothorax arising without apparent cause in presumably healthy individuals. This definition is no longer tenable and should be revised in the light of our present knowledge of the pulmonary pathology present in the majority of patients. This entity occurs predominantly in young men, although children, elderly adults and women are occasionally afflicted. Draper<sup>9</sup> estimated the incidence at

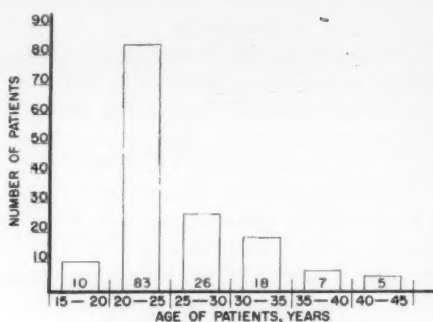


FIG. 3. Age incidence based on 147 cases.

one per 1,000 young adult men based on histories obtained from a group of service inductees. The age incidence of the patients treated for spontaneous pneumothorax at this hospital is illustrated graphically (Fig. 3). This is based on the age of the patient on admission, as recorded, which does not represent the earliest age at which a spontaneous pneumothorax may have occurred in those instances where an initial acute episode was treated elsewhere. However, 81 per cent of the patients were seen at the time of the initial attack which would tend to minimize any error. Graphic distortion was further reduced by presenting the data at increments of five years. Six patients were excluded from the graphic presentation because of extreme scattering. They were 55, 58, 58, 65, 74 and 78 respectively. The age range for this group of patients, therefore, was 18 to 78 years. In this series 61 per cent were between 20 and 25 years of age, 83 per cent occurred between the ages of 15 and 30 years.

#### PHYSIOLOGY OF PNEUMOTHORAX

An understanding of the pathophysiology of pneumothorax is essential in correlating clinical observations and rationale therapy. For practical purposes the lungs may be considered as passive structures within the bellows system of the thorax. The elastic pulmonary tissue is normally maintained in its expanded, aerated state by the slight negative pressure within the potential pleural space as compared to the atmospheric pressure present in the tracheobronchial tree.

The normal intrapleural pressure usually varies from  $-5$  to  $-10$  mm. of mercury during quiet respiration. These pressure relationships may be markedly disturbed in the presence of pneumothorax. With the introduction of air into the pleural space through a visceral pleural defect, contraction of the elastic pulmonary tissue occurs with collapse of the lung. This collapse continues until sufficient tissue has consolidated around and into the defect to occlude further passage of gas into the accumulating pneumothorax space. The ultimate size of pneumothorax is dependent on the size of the leak, the presence or absence of adhesions and the extent of respiratory effort, coughing or straining. If the pleural pressure alterations are distorted by a ball valve action of the lung defect, a tension pneumothorax results. With the development of increasing positive pressure in the pleural space the respiratory volume exchange of the uninvolved lung may be impaired by shifting of a relatively mobile mediastinum to the normal side. Also the return flow of venous blood to the right atrium may be impeded. Severe cardio-respiratory distress may ensue if progression of tension pneumothorax continues. Actually moderate degrees of positive pressure within one pleural space, such as is seen with the usual spontaneous pneumothorax, are well tolerated by the patients which we have observed.

#### DIAGNOSIS

The diagnosis of acute spontaneous pneumothorax is usually not difficult. The sudden onset of a severe, sharp pain in the chest which causes a momentary "catch" in breathing subsequently associated with exertional dyspnea is rather characteristic. However, many variations of the "typical" clinical picture can and do occur. The frequency with which several of the important symptoms and signs were encountered in this series have been tabulated (Table 1).

Pain is the most constant feature of spontaneous pneumothorax. This is usually noted on the side of involvement and is initially experienced as severe and knife-like in char-

TABLE 1  
SYMPTOMS AND SIGNS ENCOUNTERED BASED ON  
184 EPISODES OF ACUTE PNEUMOTHORAX

Symptom or Sign	Number of Occurrences	Per Cent of Total
1. Pain	177	96
2. Dyspnea	111	60
3. Decreased breath sounds	149	81
4. Hyperresonance	114	61

acter. This is aggravated by respiration. The pain may be referred to the back, shoulder or upper abdomen and may occasionally simulate that of angina pectoris, acute bursitis, perforated ulcer or acute cholecystitis. However, after several hours, usually by the time the patient has reached medical attention, the acute pain has subsided. At this time the patient may be comfortable at rest and complain only of a steady, dull, aching sensation deep within the involved side of the chest. From time to time a patient is seen who either had insignificant pain at the time of onset and fails to recall the episode, or who had no pain at all associated with spontaneous pneumothorax. One such individual in this series was entirely asymptomatic and able to carry on a full program of strenuous Marine Corps training. The pneumothorax was discovered incidental to a chest roentgenogram obtained for other reasons.

Dyspnea was a less frequently recorded symptom in this group of patients, 60 per cent of acute episodes observed. Clinical manifestation of this symptom is related in part to the degree of pulmonary collapse and in part to the amount of activity undertaken by the patient after onset. Usually these patients are not required to exert themselves unduly and become quite comfortable at rest with the passage of time. However, one must not become too complacent for the development of progressively increasing dyspnea should suggest the ever-present hazard of a possible tension pneumothorax which may require immediate attention.

The elicitation of the classical physical signs of pneumothorax—decreased or absent breath sounds and hyperresonance to per-

cussion over the involved lung—is dependent upon the size and location of the pneumothorax space as well as the diagnostic acumen of the examiner. The low frequency with which these findings were elicited in this series undoubtedly reflects a tendency to obtain radiographic studies on the basis of suspicion rather than as confirmation of a clinically established diagnosis. It is true that the diagnosis of spontaneous pneumothorax may be readily suspected in a large number of patients without a careful physical examination; however, such is not an acceptable practice.

A crunching, crackling, bubbling or churning sound, synchronous with the cardiac cycle, may be detected by auscultation over the mediastinum. This sign, described as pathognomonic of mediastinal emphysema, has not been a prominent finding in this experience. It was recorded in only four instances. Several investigators have reported a high incidence of mediastinal emphysema associated with spontaneous pneumothorax.<sup>9,10</sup> Such has not been confirmed by the majority of observers who note a much lower incidence. The lack of supporting evidence appearing in the literature is attributed both to the minimal physical findings normally present as well as a need for special roentgenographic study to reveal small amounts of air within the mediastinal tissues. The clinical detection of mediastinal emphysema of such minimal degree is of academic interest only and has no practical importance.

In most instances the diagnosis of spontaneous pneumothorax is readily confirmed by the conventional chest roentgenogram. Occasionally, where pneumothorax is minimal, or the visceral pleural reflection is obscured by rib detail, the contrast between the lung and pleural space is more obvious on expiration roentgenograms. In addition to diagnosis, radiographic examinations offer further information in regard to therapy. If more than minimal pulmonary collapse is evident, active treatment is usually advised. Further, the presence and location of adhesions may be noted as well as fluid collections within the pleural space. Also cystic

lesions within the lung fields may be observed on occasion. These findings are of value in selecting candidates likely to derive significant benefit from formal thoracotomy.

#### COMPLICATIONS

The uncomplicated episode of spontaneous pneumothorax, although frightening to the patient, is not life-endangering. However, serious complications, such as bilateral spontaneous pneumothorax, tension pneumothorax or spontaneous hemopneumothorax, must be recognized and properly treated without delay.

The most frequently encountered complication is recurrence of spontaneous pneumothorax. The reported recurrence rate varies from 10 to 40 per cent, depending in part on the length of follow up observations.<sup>4,11,12,13,14,15</sup> Rottenberg and Golden<sup>16</sup> found that the majority of repeat attacks were likely to occur within one year of the initial episode. Spontaneous pneumothorax does not always recur on the side of the original episode. An occasional patient will experience alternating episodes of pneumothorax as has been reported.<sup>4,10,17</sup> Rarely simultaneous bilateral spontaneous pneumothorax is encountered.<sup>17,18</sup> The above observations are not surprising, since the underlying pathologic process leading to pneumothorax is reasonably anticipated to be symmetrical in many instances.

In our series of patients 28 per cent were observed to have a second acute episode and 12 per cent had three or more attacks of spontaneous pneumothorax. Alternating bilateral pneumothorax occurred in six patients. An additional three patients developed recurrent pneumothorax of the contralateral lung following surgical correction for the side of initial involvement. In two instances we have had occasion to treat patients with simultaneous bilateral pneumothorax.

In any discussion of spontaneous pneumothorax or medical emergencies, tension pneumothorax and its attendant potential danger is usually introduced. The development of progressively increasing tension (increasing positive pressure within the pleural space)

sufficient to be life-endangering has been a rare occurrence in these patients. However, when such a circumstance is encountered any method of relieving the pressure is sufficient until more definitive measures can be accomplished. A large bore hypodermic needle inserted into the pleural space may on such an occasion be lifesaving. We have not observed a single instance, in this series of patients, which required such urgent and heroic action. However, frequently, at the time of intercostal catheter insertion the first evacuation of pleural gas has occurred spontaneously and rapidly indicating an increased pleural pressure although the patients were having little respiratory distress. Pleural pressure determinations have not been made in this series of patients. A majority of visceral pleural defects will have a tendency toward ball valve action initially. This is variable in each case; however, the leak is self-sealing as a rule because the collapsing lung tissue tends to occlude the defect. There may be some instances where the location of a rupture bleb coincides with the base of a pleural adhesion which would prevent collapse of the lung locally and hold the defect open.

Hemorrhage complicating spontaneous pneumothorax is extremely serious and has resulted in fatal issue on a number of occasions in the past. Hartzell<sup>19</sup> in reviewing the literature prior to 1942 reported a mortality rate of 33 per cent associated with this complication. In a more recent review, since the advent of safe thoracic surgery and more widespread availability of whole blood for transfusion, this mortality has been reduced to an estimated 14 per cent.<sup>20</sup> The source of hemorrhage of sufficient severity to be of concern is from the systemic circulatory system of the thoracic wall or mediastinum. This is most often attributable to rupture of a vascular adhesion coincident with the development of pneumothorax. The true incidence of this complication has not been determined. We have treated three patients in this series with spontaneous hemopneumothorax of moderate degree (500-1000 cc. of blood removed by intercostal catheter) with-

out resorting to thoracotomy. Lindskog and Halasz<sup>21</sup> also feel that supportive measures and transfusion will usually suffice.

Another unfortunate complication of the acute episode of pneumothorax is the progression to chronic pneumothorax. The failure of a lung to re-expand in a reasonable period of time after spontaneous pneumothorax will result in encasement by a fibroplastic membrane which will resist therapeutic efforts short of thoracotomy and decortication of the lung. Failure of the lung to re-expand may result because of continued air leak maintained by intrapleural adhesions, scar tissue in the wall of ruptured blebs or bronchiole communication at the visceral pleural surface. One of our patients required thoracotomy for continued air leak of two weeks duration while under observation and treatment. However, we have not had occasion to encounter a chronic pneumothorax in this series of patients. Such a development should be preventable provided the patient is under constant supervision, accepts the course of therapy as recommended and is not discharged from care until complete lung expansion is obtained.

#### THERAPY FOR ACUTE PNEUMOTHORAX

The evolution of etiologic concepts regarding spontaneous pneumothorax has influenced the treatment recommended through the years. During the period of popular belief in tuberculous etiology, prior to 1932, the patients were treated accordingly with prolonged bed rest as were patients with other forms of pulmonary tuberculosis. The philosophy of bed rest therapy was continued on a modified scale until recent years. More active therapeutic measures, such as pleural space drainage, have effectively reduced morbidity and afforded rapid rehabilitation of patients.

As early as 1767 Hewson described the operation, paracentesis thoracis, for relief of pneumothorax. Johnson, in 1829, extended this concept by making an intercostal incision to provide immediate relief for a patient in extremis because of tension pneumothorax. He subsequently placed a cannula through



the wound into the pleural space. He then evacuated the pneumothorax in a valvular fashion by occluding the orifice of the cannula with a finger tip during inspiration and removing this finger during the expiratory phase of the respiratory cycle. This concept was carried a step further by Nobel, in 1873, who attached one end of a rubber tube to an intercostal cannula and led the other end beneath a surface of water to observe the bubbling exit of gas from the pleural space. These early experimental measures were reserved for those pneumothorax patients with etiologic mechanisms other than tuberculosis.

Bed rest, the mainstay of therapy for many years, usually is continued until re-expansion of the lung is complete. Good results have been obtained with few complications. However, the average time required before a patient can be returned to normal activity varies from 15 to 20 days for minimal pneumothorax to 40 to 50 days for severe pneumothorax.<sup>13</sup> Kircher and Swartzel<sup>22</sup> estimated the percentage of lung collapse by comparing the area occupied in the collapsed state with that area normally occupied in the expanded state as determined radiographically. By their calculations the rate of absorption of pneumothorax was stated to be approximately 1.25 per cent per day. Actually, in our experience the rate of absorption is quite variable in individual patients. Other investigators have been impressed by the length of time required for spontaneous re-expansion of the lung and the economic loss to the patient for this period of prolonged therapy.<sup>23, 24</sup>

Thoracentesis has been advised from time to time in the management of spontaneous pneumothorax. This technique has been utilized in two separate and distinct ways. In the first instance thoracentesis has been used as an initial maneuver to readjust intrapleural pressure to near normal levels. This is frequently applied in conjunction with bed rest with the supposition that the danger of developing tension pneumothorax is avoided and the treatment program can be safely instituted without complication. In the second instance thoracentesis has been used aggres-

sively in an attempt to re-expand the lung by complete aspiration of the pleural space. Immediately following the onset of pneumothorax and for a period of several days thereafter, the visceral pleural defect, ruptured bleb or fibrotic crack, is incompletely sealed. This defect is frequently reopened as the lung partially expands allowing further air leak. The experience of doing a prolonged, tedious aspiration without accomplishing any detectable improvement either clinically or radiographically is discouraging indeed. Our observations in this regard have been confirmed by others.<sup>24</sup>

The time honored regimen of bed rest, held over from the days when pneumothorax was considered to be a manifestation of pulmonary tuberculosis, has been supplanted by more aggressive therapy in recent years. Intercostal catheter, waterseal drainage of the pleural space has been accepted by most investigators as the desired method of therapy for spontaneous pneumothorax of more than minimal degree.<sup>3, 22, 23, 24, 25</sup> The therapeutic objectives, as expressed by Rapport, *et al.*,<sup>26</sup> are to relieve symptoms, prevent complications, minimize hospitalization and to complete re-expansion of the lung. Lung expansion accomplished by intercostal catheter, waterseal drainage of the pleural space was a natural product of increased knowledge of pulmonary physiology applied in practical clinical situations. This has reduced morbidity and hospitalization for these patients.

The insertion of an intercostal catheter is accomplished without difficulty. The technique we use is essentially that described previously.<sup>27, 28</sup> The preoperative medication should include atropine or a similar drug to reduce the possible risk of a reflex-induced cardiac arrest as the parietal pleura is transgressed. The second anterior intercostal space is selected as the site of election for introducing the catheter. Sufficient analgesia for the procedure is obtained by infiltration of the intercostal tissues with an appropriate local anesthetic agent. Through a small skin incision a trocar is introduced into the pleural cavity through which a fenestrated rubber catheter is threaded. The trocar is then re-

moved and the catheter fixed in place by suture and dressing. The catheter, which remains clamped during the procedure, is attached through a glass connector and rubber tubing to a waterseal trap and the clamp removed. Negative pressure may or may not be applied to the drainage system as desired; however, we have observed slightly improved results by immediately re-expanding the lung and holding it against the chest wall with 10 to 20 mm. of mercury negative pressure.

The postoperative course of patients treated by intercostal catheter drainage is important and worth mentioning. All of the patients in this series so treated have received antibiotic therapy, either a combination of penicillin and streptomycin or a broad-spectrum agent, such as terramycin. This is rationalized on the basis that a free communication temporarily exists between the tracheobronchial tree and the pleural space with bacterial contamination. We have not attempted any control studies, nor have any been reported, to prove the efficacy or fallacy of this treatment. The intercostal catheter requires attention from time to time to prevent malfunction by plugging with fibrinous deposits in the lumen. As the lung reaches full expansion, a small amount of serous fluid may appear in the catheter. Pleural effusion has not been a feature of spontaneous pneumothorax or a result of therapy. About 50 per cent of the patients treated by pleural drainage will exhibit a mild temperature elevation during the course of therapy. This is not surprising and subsides spontaneously in one or two days. The catheter is kept in place until the lung is expanded by chest roentgenogram and leakage of air has ceased for 24 to 48 hours at which time it is removed. If it is necessary to continue catheter drainage longer than seven days, it is advisable to remove the original catheter and insert a new one in another site of election to prevent sinus tract formation and drainage. After removal of the catheter the patient is gradually ambulated and may be discharged from hospital care within a very short time.

A number of theoretical objections to this

aggressive therapy for spontaneous pneumothorax have been voiced in the past; however, in several series so treated no complications have been reported.<sup>23, 27</sup> The threat of infection, although a consideration, has not been a real problem in any patient. The possibility of holding the visceral pleural defect open to produce a chronic fistula by rapid expansion of the lung with negative pressure has not been observed. However, several real possibilities do exist and must be considered in selecting patients for treatment. We have elected to treat only those patients with sufficient lung collapse, or free pleural space, to allow safe introduction of the intercostal catheter without risk of damage to underlying pulmonary tissue. For spontaneous pneumothorax of less than an estimated 25 to 30 per cent, expansion usually occurs within a short period of time and bed rest with cautious, graduated ambulation is sufficient. Pleural adhesions not only may prevent the lung from complete collapse, or occasionally hold an air leak open by traction but also may be located in such a position as to complicate the proper placement of an intercostal catheter. Considerable intrapulmonary hemorrhage and lung damage may result from ill-advised attempts to force a trocar through such an area of dense adhesion. This is more of a problem in patients who have been previously treated by intercostal catheter drainage for past episodes of pneumothorax. Frequently, at open thoracotomy, we have observed pleural adhesions at the site of a previous catheter tract. Fortunately, we have not observed an occasion where pulmonary trauma has occurred as a complication of treatment in this series of patients.

The development of a minimal amount of subcutaneous emphysema of the chest wall in the immediate vicinity of the established catheter tract is seen occasionally. Usually this is self limited and of no clinical significance. However massive subcutaneous emphysema did occur as a serious and temporarily perplexing problem in one patient treated by intercostal catheter drainage of the plural space. In this instance the lung expanded completely within a short time after



FIG. 4. Photograph of a patient with massive subcutaneous emphysema extending to the face and eyelids. This developed as a complication of intercostal catheter drainage of the pleural space for spontaneous pneumothorax.

the insertion of the catheter. Within 24 hours a rapidly progressing subcutaneous emphysema was noted and the catheter was withdrawn. During the next 24 hours the lung remained expanded but emphysema continued to progress to a peak level extending from the forehead to the scrotum. The patient's eyelids were completely closed and could be opened only after the air was expressed by digital compression (Fig. 4). At this time a light plastic sleeve was fixed to the edges of the intercostal incision made at the time of catheter insertion to permit a valvular decompression of the continuing air leak and halt the progression of the subcutaneous emphysema. Over a period of one week the air leak subsided as did the emphysema. It was assumed that the expanded lung had become adherent about the catheter tract in such a fashion as to relate visceral pleural defect to the site of intercostal incision resulting in subcutaneous decompression. Several months later the patient underwent thoracotomy for recurrent pneumothorax at which time numerous adhesions were encountered over the upper anterior chest as had been anticipated.

A comparison of the time required to achieve complete lung expansion by bed rest as opposed to pleural space drainage is presented in Table 2. Early in this series all patients were treated with bed rest regardless

of the degree of pulmonary collapse. Gradually, over a period of several years, surgical consultation was obtained more frequently until the last two years of this study period when virtually all patients with spontaneous pneumothorax were admitted directly to the surgical service. Therefore, more than 30 per cent of the group of 80 patients treated with bed rest represent selected cases with minimal lung collapse who were not suitable candidates for catheter drainage. In spite of this strong influencing factor, the time required from the day of admission to obtain lung expansion averaged two weeks longer in the group of patients treated by bed rest. Thoracentesis was accomplished as the primary mode of therapy in an additional ten patients not tabulated. Hospital morbidity was not significantly decreased over that of the group treated by bed rest. In approximately 60 per cent of the group of patients treated with intercostal catheter waterseal drainage, negative pressure has been applied to the drainage system to promote rapid lung expansion and sealing of the visceral pleural defect against the chest wall. The most severe reaction to this rapid re-expansion of the lung has been a transient uncontrollable cough lasting approximately 30 minutes. This is not an infrequent observation.

The presentation of statistics may, on occasion, be misleading. All problems related to acute spontaneous pneumothorax are not solved by the simple statement that every patient should be treated by intercostal catheter drainage. Pain, and the necessity for relieving it by medication, is a feature of this therapy which is constant and requires con-

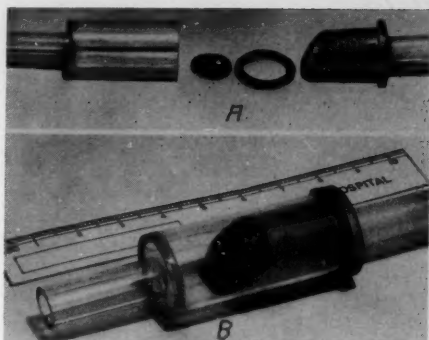
TABLE 2  
RESULTS OF TREATMENT BASED ON 140 PATIENTS  
TREATED FOR 164 EPISODES OF  
ACUTE PNEUMOTHORAX

Mode of Therapy	Number of Patients	Number of Episodes	Range of R <sub>x</sub> Days	Ave. Time R <sub>x</sub> Days
Bed rest	80	88	5-57	18
Catheter drainage	60	76	1-7	3

sideration. More discomfort is experienced by the patient when excessive lengths of catheter are inserted in the pleural space. Occasionally, the catheter becomes trapped between the expanding lung and the chest wall before expansion is complete leaving a small residual pneumothorax at the conclusion of treatment. Also the catheter may become plugged with fibrin during the course of therapy and cease to function effectively. To avoid this problem we prefer not to clamp the catheter for a trial period prior to removal. Occasionally, an intercostal catheter is removed too soon with immediate recurrence of the pneumothorax. To prevent this we leave the catheter in place an additional 24 to 48 hours after the air leak has ceased and the lung is expanded by chest roentgenogram.

Atelectasis resulting from bronchial occlusion by a mucous plug may complicate the clinical picture of spontaneous pneumothorax. This situation is unusual in our experience; however, bronchoscopy has a limited but definite place during the course of therapy in selected cases.<sup>29</sup> On several occasions bronchoscopy has been required in this series of patients. This was accomplished because of suspected atelectasis manifested by inadequate or delayed expansion of the lung during treatment, or by an unusually high fever. This complication should be kept in mind.

In conjunction with the treatment of spontaneous pneumothorax by intercostal catheter drainage of the pleural space the author has developed and clinically tested a one-way, plastic encased, flutter valve (Fig. 5).<sup>30</sup> The military requirement for a simple, safe, one-way valve for use with intercostal catheter drainage of the pleural space is obvious. The primary advantage of such a device is that the patient is not incarcerated by a water-seal bottle but may be moved about or on occasion be semiambulatory during therapy (Fig. 6). Therefore, chest casualties with spontaneous or traumatic pneumothorax may be made transportable in emergency situations. The attachment of a fingerstall to the open end of a self-retaining trocar inserted into the chest for this purpose was described



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FIG. 5. (A.) The valve, disassembled to illustrate the component parts. From left to right are the outer shell, a rubber occluding flap, a rubber washer for airtight seal, and the inner barrel. (B.) The valve assembled and ready for use. Note that the design is such that a rubber tubing leading to a suction apparatus may be attached to the distal, outer shell of the valve.

in 1939.<sup>31</sup> This has not proven to be satisfactory. On the other hand the dangers of evacuating patients with waterseal drainage are well illustrated by a recent experience. A patient was received at this hospital by air evacuation after bilateral pleural drainage had been appropriately instituted for simultaneous bilateral spontaneous pneumothorax.



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FIG. 6. A photographic illustration of the valve in use. A catheter was inserted in the second left intercostal space for evacuation of a pneumothorax. The valve was attached to the catheter as a substitute for the usual waterseal trap. The patient is semi-ambulatory and requires no specific nursing attention.

Both lungs were fully expanded prior to evacuation. On arrival one catheter was clamped and non-functioning because the waterseal bottle broke en route. The second bottle was cracked during movement of the patient immediately on arrival. The right lung was collapsed on admission. The patient subsequently required an open thoracotomy for correction and stabilization of the right lung. In this instance the difficulties might have been obviated by the use of a valve during evacuation.

Fourteen patients in this series have been treated for an equal number of episodes of spontaneous pneumothorax by substituting the valve for the waterseal trap, all with satisfactory results. Immediately after insertion of the intercostal catheter in the usual manner, the valve was attached and the patients instructed to cough. Chest roentgenograms obtained shortly thereafter revealed complete expansion of the lung in all but two instances. The patients were then instructed to carry out a Valsalva maneuver periodically to insure evacuation of any accumulated pneumothorax during the period of treatment. For the purpose of clinically evaluating the safety of this device the patients were encouraged to sit up, move about and ambulate to the bathroom. No untoward effects were observed.

#### THERAPY FOR COMPLICATIONS

The second objective of therapy for spontaneous pneumothorax is prevention of recurrences. The aim of preventive therapy is obliteration of the potential pleural space. This has been approached by both closed and open techniques. The induction of pleural symphysis by the introduction of irritating substances such as silver nitrate solution, concentrated glucose solution, blood or talcum powder into the pleural space by closed methods has been generally discarded.<sup>1, 29, 32, 33</sup> None of the above-mentioned substances have been used in this series of patients.

Thoracoscopy enjoyed brief popularity as a diagnostic and therapeutic procedure.<sup>4, 34</sup> This, too, has generally fallen by the wayside except in the hands of a few enthusiasts.

The yield of otherwise unobtainable diagnostic information is low. Lysis of adhesions by closed technique through the thoracoscope is hazardous. The risk of open thoracotomy is small and is being recommended more frequently. We cannot speak with the authority of an extensive experience about thoracoscopy; however, our therapeutic results seem to justify the thought that this is an unnecessary procedure in the vast majority of cases. Thoracoscopy was carried out in three patients early in this series without obtaining sufficiently gratifying information to warrant further trial and the procedure was quickly discarded.

The most satisfactory production of pleural symphysis or pleural space obliteration has been accomplished by the various techniques employed at open thoracotomy. In most instances surgery has been reserved for patients with one or more complications of simple spontaneous pneumothorax such as recurrence, simultaneous or alternating bilateral pneumothorax, hemorrhage, persistent air leak and chronic pneumothorax. The various operations employed by different investigators include dry gauze scrubbing of the pleura, talcum powder dusting of the pleural space and parietal pleurectomy.<sup>3, 11, 35, 36, 37, 38, 39</sup> Recently the indications for surgical intervention have been extended in a more aggressive approach to the problem of reducing morbidity. One author suggested that patients with marked lung collapse or with demonstrable adhesions be considered suitable candidates for open thoracotomy.<sup>37</sup> Another investigator reported a series of patients for whom simultaneous bilateral thoracotomies were accomplished for unilateral spontaneous pneumothorax.<sup>40</sup> This radical approach was justified on the basis that the underlying pathology, lung surface blebs and bullae, is usually present bilaterally. However, it does not seem wise to accept the risk of such extended surgery for a condition which generally is not life-endangering.

Partial parietal pleurectomy as a method of obliterating the pleural space is a very recent addition to the surgical armamentarium as an important component of the



definitive procedure for recurrent spontaneous pneumothorax. Excision of normal parietal pleura was suggested by Barrett and Daley,<sup>41</sup> in 1949, as an alternate procedure for the patient with a technically uncorrectable Tetralogy of Fallot. Blalock<sup>42</sup> agreed that some therapeutic benefit might be obtained in selected patients with Tetralogy of Fallot by increasing the systemic pulmonary blood supply following pleurectomy. Several groups of investigators studying the surgical aspects of pulmonary emphysema have utilized parietal pleurectomy in an attempt to revascularize the degenerated atrophic lungs of patients with this disease.<sup>43,44</sup> Ellis and Carr<sup>11</sup> in 1954, suggested that this procedure be utilized in selected patients with spontaneous pneumothorax for whom surgery is indicated. Gaensler<sup>38</sup> recently reported a series of seven patients in whom parietal pleurectomy was performed as an important feature of therapy. Good results were obtained in these cases with excellent fusion of the lung to the chest wall.

An important consideration in any thoracic surgical procedure is the potential postoperative impairment of pulmonary function. The effect of thoracotomy and talcum poudrage has been investigated revealing a pulmonary function pattern similar to that observed following any acute pleuritis.<sup>45,46</sup> There is a moderate restrictive element which persists for several months with a gradual return to preoperative function within the first year. Similarly, pulmonary function studies following dry gauze abrasion of the pleura reveal little or no residual impairment.<sup>47</sup> Also following pleurectomy there has been no measurable loss of function in reported cases.<sup>38</sup> Therefore, residual impairment of pulmonary function following definitive surgery for recurrent or otherwise complicated spontaneous pneumothorax is not a major problem.

Since August, 1951, we have performed partial parietal pleurectomy as an important component of the surgery for spontaneous pneumothorax as well as bullous emphysema.<sup>30</sup> The surgical removal of the parietal pleura is not a difficult or time-consuming

procedure in the absence of pathologic changes. The incised edges of the pleura are identified at the margins of the thoracotomy wound. The pleura is gently teased away from the chest wall by blunt dissection. As the cleavage plane is developed the pleura is freed superiorly over the apex of the thorax and mediastinal reflection. The dissection is carried to the azygos vein on the right or the aorta on the left where the pleura is excised. Inferiorly the pleura is removed to the diaphragmatic reflection. No attempt is made to excise the pleura of the diaphragm or pericardial surface. We feel that lung repair with minimal tissue excision, parietal pleurectomy, followed by continuous, active and complete re-expansion of the lung is a reliable method of obliterating the pleural space.

Eighteen of the patients seen in this series have had definitive surgery for spontaneous pneumothorax. The indications for surgery are tabulated (Table 3). Usually surgery was not offered unless the patient had three or more episodes of unilateral pneumothorax. The demonstration of bullae by chest roentgenogram associated with spontaneous pneumothorax was accepted as evidence of the need for definitive therapy. One of the four patients in this group required bilateral surgery staged two months apart for alternating bilateral pneumothorax with bullae of both lungs demonstrable by chest roentgenogram. The three patients with alternating pneumothorax had a total of three or more episodes respectively at the time surgery was recommended. The patient with simultaneous bi-

TABLE 3  
INDICATIONS FOR THORACOTOMY FOR  
SPONTANEOUS PNEUMOTHORAX

Indication	Number of Patients
1. Pneumothorax, recurrent, unilateral	9
2. Pneumothorax, recurrent, with bullae	4
3. Pneumothorax, alternating, bilateral	3
4. Pneumothorax, simultaneous, bilateral	1
5. Pneumothorax, persistent air leak	1

lateral spontaneous pneumothorax had surgical intervention for stabilization of one lung and at the time of discharge was considered to be a likely candidate for further surgery in the future. Finally one patient in this series required thoracotomy because of persistent air leak and incomplete lung expansion after adequate therapy with intercostal catheter, waterseal drainage of the pleural space. Other patients observed in this series of cases were offered definitive surgery but declined for various reasons.

The rationale for selecting parietal pleurectomy as an important component of the definitive surgical procedure is twofold. This is not only an effective method of obliterating the pleural space but also provides an increment of increased blood supply to the lung surface. The gross pathology found at surgery, in the majority of instances, is suggestive of a peripheral pulmonary vascular ischemia. The finding of blebs, bullae, adhesions, parchment-like changes of the lung surface with multiple visceral pleural cracks as well as loss of elasticity of the lung is suggestive indeed. In this series blebs or bullae were grossly evident over the lung surface at thoracotomy in 15 of the 19 operative procedures. In three instances only visceral pleural cracks or adhesions were evident. Finally in the patient with persistent air leak only a single 2 mm. lung surface defect with rolled in fibrotic edges was evident at surgery.

The postoperative complications are presented in Table 4. In only one instance was the postoperative course particularly difficult.

TABLE 4  
COMPLICATIONS OF SURGERY

Type	Number of Patients
A. Major Complications:	
1. Atelectasis	1
2. Pneumothorax, opposite side	2
B. Minor Complications:	
1. Air leak over 5 days	3
2. Residual pneumothorax	3

This patient developed a severe atelectasis of the lung on the side of operation with temperature elevation which did not respond to the usual measures including bronchoscopy. Within the first postoperative week he also developed a spontaneous pneumothorax of the contralateral lung. A second patient in this series had a contralateral spontaneous pneumothorax which occurred on the third day after surgery. This required closed thoracotomy and waterseal drainage of the pleural space and the patient recovered without further incident. A persistent postoperative air leak was noted on three occasions; the most worrisome of these continued over a nine-day period. This complication has been more annoying to the physician than harmful to the patient. In three instances a small residual pneumothorax space was evident over the apex of the lung on chest roentgenograms following removal of the thoracotomy drainage tubes. In each instance the lung expanded to fill the space without further treatment. In a single patient this extended over a four-month period of observation after returning the patient to normal activity but the course was otherwise uncomplicated.

Postoperative hemorrhage is a potential threat following pleurectomy. Usually few, if any, major bleeding points are identifiable along the denuded surface of the chest. Major vessels such as the innominate vein, superior vena cava, azygos vein or intercostal vessels conceivably might be torn by the unwary or careless surgeon. With ordinary care this should not be a problem. However, moderate postoperative drainage is expected. The average whole blood replacement administered during surgery and the immediate postoperative period has been 1500 cc. This has varied from a replacement of 500 cc. in several patients to an extreme of 3500 cc. required in one case.

The results following surgery have been encouraging. There have been no recurrences of pneumothorax on the side of operation. The longest follow up period is now three years in one patient. The shortest period of observation postoperatively is six months. In six of these patients there have been one or

more episodes of pneumothorax on the contralateral side. This led to a second thoracotomy in one patient. The others have been considered as possible candidates for further surgery but at the present time appear to be doing well and a second operation has not as yet been advised. The postoperative contralateral spontaneous pneumothoraces have been equally divided among patients who had not experienced previous episodes on that side prior to operation (3 cases), and those who had experienced previous episodes on that side prior to operation (3 cases). From this experience we do not feel that bilateral thoracotomies accomplished at one sitting for patients with spontaneous pneumothorax is justifiable since less than 30 per cent of the group coming to surgery will have sufficient difficulty to require operation on the contralateral side. For the few patients that will ultimately require bilateral surgery the morbidity can be minimized by staging the operative procedures at intervals sufficient to allow recovery of the patient in the interim.

#### SUMMARY

Our experience with 156 patients treated for 184 episodes of spontaneous pneumothorax has been presented and compared with that reported by other investigators. An increasing prevalence of this disease has been noted among the military population served by this hospital. The etiology of spontaneous pneumothorax can no longer be considered idiopathic; lung surface blebs and bullae are usually found over the upper lobes. The pathologic changes are suggestive of an underlying peripheral pulmonary vascular ischemia. The best treatment for acute pneumothorax is intercostal catheter drainage of the pleural space for patients with more than minimal lung collapse. In conjunction with this treatment a plastic encased valve has been developed and clinically tested to meet the military requirement for a simple, safe substitute for the waterseal trap. Partial parietal pleurectomy has been investigated as an important component of the definitive surgery for the complications of spontaneous pneumothorax. This has proven to be an excellent

method of obliterating the pleural space. This procedure also enhances the blood supply of the peripheral lung tissue which may be of benefit in preventing progression of pathologic changes in the lung. The results have been sufficiently encouraging in this series of patients to warrant continued employment of the procedure.

The modern approach to spontaneous pneumothorax will decrease hospital morbidity and provide a more effective utilization of manpower during periods of total mobilization. The combat soldier may be retained closer to his unit and returned in a short time. In contradistinction to the experience of World War II, patients need not be separated from the service for recurrent pneumothorax. These individuals may be surgically rehabilitated and returned to full military service including flying status in selected instances. As a result of increased knowledge and understanding achieved in the past two decades the future can be approached with the certainty that spontaneous pneumothorax is a surgically correctable lesion comparable in many respects to the problem of inguinal hernia.

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# The Recruit Prisoner

By

CHESTER M. PIERCE, M.D.\*

"**M**EDICINE considers all human behavior and function susceptible to explanation by scientific principles."<sup>1</sup>

An investigation of brig problems offers a singular opportunity for a wide variety of research inquiries into general psychiatry, psychosomatic medicine and criminologic psychiatry. The practical benefits of such investigations aim at effecting a major economy for the government and at the same instance yielding an augmentation to both military efficiency and service morale.

The recruit prisoner epitomizes nearly all problems met in brig medicine. His confinement, like that of non-recruits, chiefly is subsequent to unauthorized absence but may result from many other offenses ranging from robbery to mail tampering. The present study outlines some common problems encountered in recruits in a large brig and suggests measures which may be instituted to alleviate cer-

tain difficulties and thereby render greater military effectiveness.

Once confined, the recruit presents incessant obstacles to administrators because of intractable resistiveness and passive obstructionism. At other times, he is hazardous overtly since he alone, of all confinees, is likely to attempt a suicidal gesture. During a 10 month observation period, there was one assault on a guard and one escape attempt. A recruit, in frenzy, was the guard's assailant. Three of four escape attempt participants, including the leader, were recruits.

## THE RECRUIT AS A RECIDIVIST

Since generally he has demonstrated a refractoriness to disciplinary measures which suffice to deter his peers from offending, a recruit who arrives in a brig is a recidivist. To validate this hypothesis it was determined, on a day chosen at random, how many recruits were serving confinement. Table 1 shows that only about 2 of every 1,000 recruits are confined at any one time. This means that to the overwhelming majority of men the customary discipline in recruit training is easily able to force obedience to the law.

Most recruit prisoners have a marginal preservice adjustment. Ineptitude and inter-

The opinions or assertions contained herein are the private ones of the writer, and are not to be construed as official or reflecting the view of the Navy Department or the Naval Service at large.

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TABLE 1. INFORMATION ON RECRUITS ON A RANDOM DAY (2-10-56)

1) Approximate number of recruits in naval training (excludes recruits on leave, in the hospital, at separation center or AWOL)	16,122
"Boot" Camp	14,633
Dental Company (getting teeth repaired before entering training)	116
Preparatory School (acquiring fifth grade literacy before entering training)	626
Neuropsychiatric Unit (awaiting presentation to Aptitude Board to determine suitability for service)	62
Medical Company (getting evaluation of defects noted at initial examination)	85
Forming companies (being processed to enter boot camp)	600
2) Total number of men in the brig	223
3) Total number of recruits in the brig	38
4) Percent of recruits in the brig from naval training	approx. 0.2
5) Percent of recruits in brig population	17



personal clashes pervade their whole lives. Often he demonstrates fringe of the law or outlawed antisocial behavior, poor scholastic adaptation and unsatisfactory occupational efforts.

However, the military is more concerned about service performance. Accordingly one hundred consecutive new recruit confinees were observed at the time of their confinement in regard to previous history of membership in a disciplinary retraining company and evidence of grossly inferior scholastic attainment. For control, identical data was recorded on one hundred members of regular training companies who were selected at random by the recruit training officer. This officer designated certain companies in their final week of training to appear in mass for individual interviews by the examiner. Therefore the controls, unlike the prisoners, had sufficient performance records to complete training.

Table 2 summarizes the results of this inquiry. Statistical analysis of the material reveals very high significance in the fact that the experimental group exhibited more unfavorable traits in massively preponderant quantity. Over half of the prisoners had been in a disciplinary retraining unit (therefore aptly termed recidivists). Over a fourth of the prisoners entered the Navy without fifth grade education. Over a fourth of the prisoners had been confined previously by the military and two out of five prisoners had already had a court martial (for an offense un-

related to their present problem and usually not resulting in a confinement).

Therefore, it is not unusual for the recruit prisoner in the short time he has been in the service, to perform so objectionably that he has been in a disciplinary unit, obtained a court martial and even served multiple brig confinements. A number of these men suffer from lack of formal education. The successful recruits are in marked contrast.

In order to better appreciate economic aspects it is pertinent to consider the length of time spent in previous confinement, by these recruit prisoners. It was found that exclusive of travel time and time spent in the custody of civilian authorities, the average length of time the recruit prisoner was confined amounted to 14.3 days. If one considers only the 29 men who had been incarcerated previously, their average length of confinement was 49.3 days, before being returned to duty.

The data sustain the clinical impression that it is erroneous to return a recruit to duty once he has arrived in a brig. One wonders if perhaps the military over-emphasizes with these youths in an effort to provide "every opportunity." An alternative supposition is that there is considerable emotional investment by the service both to exact punishment and demand conformation. Even during the course of this study men were returned to duty who swore continued agitation to receive discharge. These men were well known to chaplains as well as line, legal, medical, and brig officers.

TABLE 2. SERVICE PERFORMANCE DURING RECRUIT TRAINING

Datum	of 100 recruit prisoners	of 100 recruit controls	$\chi^2$	Probability	Statistical interpretation
1) Had been in preparatory school	27	3	15.31	<0.001	Very Highly Significant
2) Had been in disciplinary retraining company	52	2	61.9	<0.001	Very Highly Significant
3) Had had a court martial	*40	0	46.8	<0.001	Very Highly Significant
4) Had been in a brig	*29	0	31.5	<0.001	Very Highly Significant

\* For an offense *unrelated* to the presenting offense which necessitated confinement during this study.

This study indicates that the recruit prisoner has had ample opportunity. As a result of being returned to duty, an embittered, poorly motivated youth must overcome the realistic stigma of being a "brig rat." His performance declines further and he is again the object of costly court procedure and internment. Contemporaneously, other enlisted men (even brig personnel who don't work in this man's division) verbalize dissatisfaction that such a person repetitively commits enormous misdeeds and yet is retained in the service. Thus morale and discipline is negatively affected.

From the perusal of these facts the conclusion is inescapable that only in highly exceptional circumstances should a recruit be retained in the service once he has been sent to a brig. Since recruit prisoners as a group show homogeneity in their civilian and military careers, the research indication is toward evolving a system whereby these men can be detected rapidly and excluded from service.

#### THE RECRUIT AS A PSYCHOTIC

Every patient seen by a psychiatrist evokes two diagnostic possibilities. The psychiatrist is alert always to the likelihood of psychosis and to the probability of suicidal attempt.

Patient A, a recruit, demonstrates the co-existence of suicidal intent in a psychotic. This combination is too well known to be unusual,<sup>2</sup> but in the brig it may be dramatically disquieting. Patient A entered recruit training where he suffered homesickness and separation anxiety. He developed a somatic delusion involving the thought that his head was "slipping, cooling, loosening and about to explode." Unable to obtain medical relief he went AWOL but was apprehended. He was then recognized as schizophrenic and his charges were remitted. Since he was placid and cooperative it was elected to keep him in the brig to await appearance before an Aptitude Board. One morning, in the throes of headaches, a voice told him he could obtain relief if he would shut off the air going to his head. To accomplish this he attempted to hang himself, failing only because of a

clumsy effort plus the astuteness of attending guards.

Another facet of psychosis which is of particular concern to the brig psychiatrist, is the contemplation of homicide by the psychotic. Karpman<sup>3</sup> points out that the criminally insane may possess an especially potent hatred. Patient B, a recruit, illustrates how this hatred is capable of potentially serious sequelae.

Patient B had been in contact with God for some months prior to enlistment. After arrival in the service, he felt inadequate and unable to compete with his peers in preparatory school. To compensate for this misfortune, he states that God gave him a dog, a monkey, and an elephant. One day he hallucinated that his company commander deliberately ran an automobile over the elephant. B, with a cool detachment began to elaborate a plan to dispatch this company commander, but happily, B was caught in unusual sexual circumstances with another recruit. This resulted in an incarceration before B could implement his planned attack on the company commander. At the time of confinement B was cogitating suicide. In the psychoanalytic literature it is reported that psychotic murderers may give a long history of suicidal preoccupation.<sup>4</sup>

It is not known what percentage of the brig population would be found to be psychotic. Probably, the discovered incidence would be much higher than that found in the general population. Of one hundred consecutive and unselected diagnostic consultations made at this brig, seventeen men were judged psychotic. Such diagnoses were confirmed at a Naval hospital. Eight (47.1%) psychotics were recruits. Oltman and Friedman found 26% of 100 criminals to be psychotic.<sup>5</sup> The conclusion here concerns the importance of early diagnosis of the psychotic recruit.

It follows that psychotics in a military service are as dangerous to the society as any unselected group of psychotics. In addition they represent security and disciplinary liabilities which obviates completely any possible contribution they might make in the armed forces. Since psychotics tend to gravi-

tate to the brig it devolves upon the brig psychiatrist to recognize them so that they may be handled humanely in regard to their medical and legal difficulties.

#### THE PROBLEM OF THE MENTALLY DEFECTIVE

One must compare type of offense, age, sex, and socio-cultural background in studying deficiency in prisoners. An analysis of 245 female prisoners at a New York hospital demonstrated 10% to be defective.<sup>6</sup> Zwerling et al<sup>7</sup> found 6% of 200 patients in a general hospital surgical service to be mentally deficient. However, 44% of insane arsonists studied in Britain were found to be defective.<sup>8</sup>

Recruit C (I.Q. 82) illustrates the borderline mentality as found in a naval brig. C, decided that naval regimentation and military demands were too rigorous. One day he went AWOL but returned quickly when he recalled that he was scheduled to appear at Captain's Mast. In the brig he is charmingly naive and the butt of jokes by all his colleagues. He enjoys brig life since it is uncomplicated and in a protected environment which fails to emphasize aggressive competition. Accordingly, he makes frank commentary concerning his intention to spend his entire enlistment in confinement. To accomplish this objective he calculates to pyramid his sentence through mischievous behavior while interned and deliberately go AWOL if he is released.

Such a person is an expensive liability. The effect of punishment is useless since he is anxious to accept it but is too dull to appreciate its objectives. As in the case of other problems the research need is to devise a simple and relatively inexpensive means of detection.

#### THE RECRUIT AS A SUICIDE RISK

All prisoners must curb overt projection of aggressivity. When pressured by an inability to deal with an inflexible environment or when rebuffed by efforts to gratify narcissistic demands, the prisoner, in helpless fury, may turn his aggression toward himself.

There exists also the real possibility that the aggression will be turned externally. This possibility explains the psychologic relationship between suicide and homicide, which learned observers have known for over a century.<sup>9</sup> Hence, the potential extraversion of aggression by a person with suicidal rumination may result in murder.

Suicidal preoccupation of varying degrees sometimes during a confinement, is acknowledged by many prisoners. Usually a suicide attempt is a conscious effort to maneuver others and to gain attention, e.g. "I did it because I gotta get out of the Navy." However, not infrequently suicidal ruminations in prisoners seem to be subsequent to unconscious homosexual conflicts. Reference has been made about suicide thoughts in psychotics. The physician must diagnose the etiologic factors and prognosticate the seriousness of suicidal thoughts so that he may advise the brig administrators in the proper management of the case.

It should be mentioned that recruits with immaturity reactions form the large majority of patients entering a service hospital as a result of suicide attempt.<sup>10</sup> Quantitatively, a suicide attempt is more likely to occur in an immature person or a defective. Such attempts by servicemen with immature personalities are capable of fatal consequences, particularly if committed in an impulsive manner.<sup>11</sup>

Patient D's case typifies the impulsive suicidal gesture by an emotionally unstable youth. D worried over family finances and the health of his parents. Despite these realistic troubles, he made a precipitous marriage to a sickly girl, aggravating his mental situation. He rationalized that he should be home and decided immediately to go AWOL. After apprehension, he mulled over his domestic turmoil and chafed at being "locked up." He reasoned that a speedy separation from the Navy would eliminate all his problems. On the eleventh day of confinement he awoke and brooded further over the delay in being tried. Suddenly he decided to force the issue by a histrionic gesture at hanging which was timed to occur just as a guard appeared. At

interview D confessed sorrow concerning his suicide attempt. He related suppressed desires to hit the wall and smash furniture in order to relieve explosive inner tension and "break the monotony" of being in the brig. His past history contained lifetime psychogenic somatic complaints and an arrest for rape.

#### THE PROBLEM OF DISCIPLINE

Cleckley<sup>12,13</sup> has delineated the characteristics of the psychopath which contribute to near insurmountable grief for the community as a whole. The psychopath is found commonly in a prison,<sup>14</sup> where his persistent misconduct is the bane of existence to administrators. Both individually and collectively psychopaths may conspire to acts of insolent passivity or open defiance which may result in disruption of routine even to the point of riots and "Kangaroo" courts.

Briefly, this man with strong migratory tendencies, operates without a conscience and is capable of all manner of antisocial acts. Longitudinal history is replete with cheating, lying and impulsive actions taken with total disregard to future probabilities. He seems unable and unwilling to profit by any punishment and he shows amazing incomprehension concerning his unsatisfactory social adaptation. His life is ungoverned by even the simplest long term goal. In conversation he may be so brilliant and sparkling that he is able suavely to talk himself out of many of the daily imbroglios he creates.

Patient E, age 17, went AWOL from "boot" camp because he "couldn't stand being cooped up." Following apprehension, E alleged piously a patriotic motivation in his request to be returned to duty. An examining physician notwithstanding E's ingratiating manner, recommended that E be discharged from service.

By the tender age of 16, E had been expelled from school and had been arrested for forgery and larceny in cities 3,000 miles apart. After he impregnated his brother's wife and had been fired from three jobs, he joined the Navy. In "boot" camp he assaulted a shipmate with a rifle piece.

E's sentence demanded return to duty. Before completion of the sentence E was involved in so many infractions of brig regulations (threatening assault on guards, deliberate disobedience, fighting, malingering, etc.) that he finally received an undesirable discharge.

This case illustrates the type of man whose liabilities have offset possible assets which would make him useful either in peacetime or wartime. Dunn<sup>5</sup> reviews the experience of many armed forces in regard to this sort of individual. Even in totalitarian governments under wartime mobilization, it was found best to eliminate him from service. Although the needs of the country might demand their utilization in some capacity in times of war, in peacetime many of the men who exhibit this defect should not be permitted to remain in the armed forces *after* they have had a trial at duty which demonstrates an inability to adapt.

#### THE PROBLEM OF HOMOSEXUALITY

From the beginnings of history in widely diverse civilizations, homosexuality has flourished.<sup>16</sup> Military organizations deal vigorously with homosexuality since it is devitalizing and damaging to morale. Also present government directives earmark the homosexual as a possible security risk.

All personnel who have worked in a prison setting realize that the homosexual presents constant problems. He must be discovered and segregated in order to prevent homosexual acts with other homosexuals and to preclude seduction attempts on the sexually deprived heterosexually adjusted prisoner. Often men from entire cell blocks will be debauched into homosexuality. Equally important is that homosexual anxiety may mount to suicidal panic proportions when the man is forced to remain in an area with other males. Likewise, certain prisoners, often with latent homosexual conflicts, use the known homosexual as a target for their unsavory attitudes toward confinement. Thus, the homosexual must be discovered and segregated.

More important in this discussion is that a known homosexual is discharged from the

military.<sup>17</sup> Knowledge of this fact invites many recruits to confess homosexuality, fraudulently, in an effort to escape service obligation. In investigating the veracity of such confessions, the physician is sought for expert opinion. Smith<sup>18</sup> has pointed out the extreme difficulty in making a diagnosis of homosexuality. There are no pathognomonic signs of homosexuality and the doctor must rely on clinical acumen to decide if the confinee is truthful in his allegations.

Hence there must be located a solution to the problem of determining homosexuality. Such a method of determination is needed in the military because of administrative and morale considerations. If the service could perfect an aid in the diagnosis of homosexuality, it would have wide application in many spheres of psychiatry.

#### THE PROBLEM OF AWOL

Although the scope of this paper omits discussion of specific charges, any cogitation involving military prisoners, particularly recruits, must address itself to the problem of unauthorized absence. This one offense accounts for perhaps 90% of all brig admissions.

Compared to careful war time studies,<sup>19,20</sup> the motivation for AWOL is essentially unchanged. The commonly stated reasons for AWOL still include: dislike of duty, nostalgia, excessive drinking, family sickness, failure to receive medical care, homesickness, desire to marry, desire to see a baby, illness on leave, seasickness, aquaphobia, late transportation, shipmate conflicts, attachment to mother, detention by civilian police, inability to adjust to the service, homosexuality, objection to restriction and regimentation.

Further comparison<sup>21</sup> shows that in the past decade most absentees have continued to premeditate AWOL. Nowadays, however, unlike the situation of about a decade ago, most men go on unauthorized absence despite adequate knowledge of the enormity of the offense and its penalty. At this brig 150 out of 150 prisoners charged with AWOL admitted readily both forethought and knowledge of the penalty prior to their absence.

Unauthorized absence usually expresses but one part of a general personality disorder. The prisoner is correctly categorized as a "chronic offender"<sup>22</sup> or a person whose transgression is not indicative of an acute situational process or a momentary or accidental involvement. Often the same man has been AWOL frequently and indubitably he has invited consciously his own catastrophe. Roche<sup>23</sup> has discussed why some criminals enjoy being punished and therefore constantly get into trouble.

Psychologically, the AWOL offender reflects an inept transition between civilian and military life. Some of the reasons for this type of ineptitude have been categorized.<sup>24</sup> The AWOL offender has major and lifelong lacunae in submission-dominance patterns and shows petulance at conformity and routine. He is unable to sustain meaningful interpersonal relations and characteristically his enlistment motivation was to obtain an escape from multiple civilian dissatisfactions.

#### THE PROBLEMS OF AMNESIA

No problem confronting the brig psychiatrist is more taxing or more crucial than the solution to the cause for a putative amnesia. Eminent authorities teach that the differential diagnosis must embrace hysteria, psychosis, malingering, alcoholism, head injury and epileptic fugue.<sup>25,26</sup> It is the latter two diagnoses which compound the difficulties of brig medicine.

The reason for this is that within two years of a serious head injury about 10% of the cases will develop a post-traumatic epilepsy.<sup>27</sup> Nearly everyone can tell of some head injury which might have resulted in post-traumatic epilepsy, even though, reputedly, a closed skull injury, regardless of its severity, rarely results in post-traumatic epilepsy.<sup>28</sup> Often, however, it can be proved that a recruit had suffered a head injury which could be classified as "severe"<sup>29</sup> (unconscious for over one hour, bloody spinal fluid, brain laceration, compound fracture, depressed fracture, subdural or extradural hematoma). Therefore, when faced with an



alleged amnesia, it is always possible that an epileptic process is implicated.

Even more puzzling are cases of amnesia in a person with a history of syncopal attacks, episodes of transient dizziness, blurring of vision (often secondary to light stimulation), "blackouts," abdominal sensations and weakness. There may be episodic transient unconsciousness but there are no definite convulsions. In such cases the electroencephalograph is abnormal,<sup>30</sup> yet because of medical and social consequences of the word "epilepsy," the term generally is not used.<sup>31</sup> These types of cases are seen with especial frequency in the brig and the problem is legal as well as medical since if the word epilepsy is utilized the law may take a different course of action.

The military research need here is to help remove some of the obscurity associated with this sort of subclinical epilepsy. It is of interest to note that in a group of 259 sailors, 21.6% had abnormal EEG's.<sup>32</sup> Most of the abnormalities were found in men who had a history of fainting spells, head injuries, long headaches, nervousness, insomnia and easy fatigability. Such symptoms are usually located in recruits claiming amnesia.

British workers have worked out the formula for many cases of service connected psychogenic amnesia associated with fugue states.<sup>33</sup> Roughly, a grudge against the service results in, "I can't stand it." This goes on to, "I must get away." Finally, the actual fugue takes place. The amnesia serves to eliminate memory of a psychically intolerable offense.<sup>34</sup> The brig doctor sees many examples of this psychodynamic constellation.

#### PROBLEMS SIGNIFICANTLY ABSENT

From an investigative viewpoint it is important to be aware of problems which are conspicuously absent. In the brig some conditions are seldom seen which are boldly tabulated in the medical literature. More understanding of the reasons for the paucity of certain conditions might help to elucidate mental disorder in and out of the brig.

In a ten month period, there was not one case of exhibitionism and only several cases

of pedophilia. A few homosexuals admitted a history of transvestitism. There were no cases of voyeurism or scopophilia.

About 35% of all civilian sex cases are cases of exhibitionism.<sup>35,36</sup> This means that this sex offense is the one seen most commonly by the alienist. Perhaps servicemen, even as recruits, do not resort to indecent exposure because the membership in a socially acknowledged "masculine" group, obviates the need to prove masculinity. Also, recruits become less inhibited when away from home and may respond to peer group standards and be more aggressive in obtaining sexual relations with prostitutes and promiscuous women known by their friends. Another reason for the relative lack of sexual offenses may be that the uniformed man is harder to identify and therefore more difficult to be detected. Finally, the potential and known sexual offender would be more likely to be rejected for enlistment.

Approximately one out of every 100 recruits is discharged from the service because of enuresis.<sup>37</sup> Sleepwalking is often seen by medical officers.<sup>38</sup> In a ten month period at the brig there were only four known enuretics all of whom were recruits. Another man deserted from boot camp and at age 40 was still a sleepwalker and an enuretic. The male enuretic may be covert in expressing hostility.<sup>39</sup> Perhaps the youth who arrives in the brig is more likely to express resentments directly and therefore eliminates the psychologic function for enuresis. Undoubtedly, the attitude of the brig wardens also serves to discourage a prisoner from allowing a bed wetting habit from being made public. The close confinement and the relatively large number of observers may be factors in decreasing the discerned incidence of somnambulism since a sleepwalker awakens when he bumps an object or hears an observer's warning.

There were no recorded cases of acute hallucinatory, fleeting confusional states characterized by approximate answers and followed by amnesia. Such symptomatology was described by Ganser in 1897<sup>40</sup> and occurs frequently in prisoners. It may be that these

transient states are an invariable prelude to a psychosis<sup>41</sup> and therefore when the prisoner reaches medical attention he has already developed a full blown psychosis.

#### RECOMMENDATIONS

The aim in recommendations concerning recruit prisoners should be to help bring about the hope of the celebrated jurist,<sup>42</sup> who conceded joyfully, long ago, "... the fullness of my belief that at a day not far remote the teaching of biochemists and behaviorists, of psychiatrists and penologists will transform our whole system of punishment for crime."

1. *Group Psychologic Testing to Discover Psychotics and Defectives.* A psychologist, armed with facts culled from interviews performed routinely by chaplains, legal and brig officers could administer group projective and psychometric examinations to incoming recruit prisoners. Following individual inquiries he would be able to indicate to the doctor, which men should be further evaluated. This procedure could be done on a part time basis by available psychologists without disruption to their other duties.

Technically, the psychologist would have to gauge when a person made a frank effort. Since it would become apparent that poor performance on these tests might eventuate in discharge, many prisoners purposely would not cooperate. However, the examiner would have at his disposal certain other documents such as GCT score, social service history, company commander report, health record and legal data which would help dissolve some of these worries.

After group testing and individual evaluations, the medical department could recommend discharge from service if there was not discharge as a result of disciplinary action. Of course, any person too sick or too inadequate to participate intelligently in his own defense would be brought to the attention of the command.

2. *Boards to Find Means to Eliminate Trial Delay.* Frequently trial delay is inevitable because of particular circumstances of a case. Yet, it is important to seek means to rectify needless trial delay which results from certain administrative encumbrances.

Senior grade line, legal, medical and chaplain officers at representative installations of all branches of the service could make recommendations on methods by which a man could more quickly come to trial. Protracted delays result in loss of motivation for service by many men, increases suicide attempts, and intensifies brig management.

Oftentimes, for example, a minor clerical error in a service record which could be amended locally, necessitates return of the record to its source in order to comply with regulations. At times, also, there seems to be prolonged pre-trial investigations despite confession by the prisoner of his AWOL and statements concerning his apprehension by reputable civilian authorities.

All senior officers, particularly convening authorities, are aware of these sorts of delays. Without excessive effort they could compile opinions which could be examined by the Defense Department in order to discover means to avoid needless delay which is expensive, demoralizing, hazardous and inhumane.

3. *Correlation of Brig Research Data by the Armed Forces.* From the strictly military viewpoint there are countless areas of fruitful research in the realm of forensic psychosomatic medicine. For example, psychophysiological tests such as that of Funkenstein<sup>43</sup> might be performed in an effort to learn more of renegade behavior in prison and perhaps more about hypertension in young, "healthy" males.

A thoughtful, long range program utilizing multifactorial analysis of psychosocial data would provide research clues regarding the evolution of criminality. Once the plan was formulated it would demand centrally located statisticians to collate the material from the various armed forces. Enlisted personnel could be instructed, locally, how to use a questionnaire to procure the desired material.

The military could invite the collaboration of outstanding penologists, sociologists, lawyers and doctors to establish research needs to which the armed forces is in a position to contribute. Such professional skill would no doubt be supplied gratuitously and would allow the military to learn in what man-

ner it alone can benefit the society. Theoretically such benefits would result in greater efficiency to the armed forces since society would be aided, ultimately, in its fight against crime. Therefore there would be less criminal action in the service.

One contribution would be to conduct follow up studies of brig prisoners both while they are in the military and after return to civilian life. The research advisory board could detail methods of attaining such information.

4. *The Need for Special Research Programs: Epilepsy, Homosexuality and AWOL.* Although much data from various brigs could be integrated centrally without particular regard for the individual brig doctor's interest in research, some brigs would have to be staffed by men with research inclinations. At present, research is much more promising and much more necessary than therapeutic attempts. Ruesch<sup>44</sup> mentions the obstacles associated with therapy in offenders while they are imprisoned. These barriers include the fact that the psychiatrist is part of the society which impounded the offender as well as the fact that progression in psychotherapy must be pursued in terms of an external reality impossible to the prisoner while he is in servitude. Lastly there are not enough therapists for the number of prisoners.

Special problems are epilepsy, homosexuality and AWOL. A large and critically controlled study (452 criminals and 1432 controls) revealed no significant differences in electroencephalograms of criminals and non-criminals.<sup>45</sup> For reasons outlined in the present study the service population of criminals may have more brain wave abnormalities, particularly if sought for by means of sleeping records or after sensory stimulation. Refined electroencephalographic and clinical studies are needed to elucidate epilepsy in service personnel. One possible clinical source is clarifying the interrelationship between enuresis, somnambulism and epilepsy.<sup>46</sup>

To determine homosexuality, besides the standard psychiatric and psychologic exami-

nations, ancillary procedures such as narco-analysis<sup>47</sup> and polygraphs might be employed. Since some homosexuals show less overt interest in pornography<sup>48</sup> an intriguing possibility would be the development of a projective test of personality constructed along purely psychic or psychophysiological lines in order to elicit the response of the subject to a pornographic demonstration.

Borrowing from the industrial physicians, the military might attempt group sessions with selected groups of senior petty officers and junior officers in order to see if such therapy would decrease the incidence of AWOL in contrast to control divisions. Group therapy is indicated specifically for brig personnel in order to channelize aggression toward prisoners, which is certain to arise.

#### SUMMARY

The object of this report is to epitomize common psychiatric problems in recruits in a brig and to indicate pathways whereby research could result in economic and morale assets to the armed forces. Some of the problems can be manipulated without extraordinary demands on available facilities and would remain compatible with existing regulations.

Problems discussed included: the recruit recidivist, psychosis, mental deficiency, suicide attempts, renegade psychopaths, homosexuality, unauthorized absence, amnesia, and problems conspicuously absent.

Recommendations are made which could be implemented and which would utilize a hitherto virgin field of inquiry, namely, psychosomatic forensic military medicine. These recommendations include: the use of group testing of prisoners, boards to find ways to reduce delay in trial, correlation of brig research data by all armed forces and the need to work on special investigative projects.

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## EDITORIALS

### The NATO Handbook of Emergency War Surgery

*Guest Editorial by*  
AMOS R. KOONTZ, M.D.

IN 1952 NATO Headquarters in Paris decided to get out a Handbook on Emergency War Surgery. Three surgical consultants representing the military medical services of France, the United Kingdom, and the United States were appointed as a committee to develop the Handbook. The Chairman was Brig. Gen. Sam F. Seeley, MC, USA. The committee was assisted by observers and recommendations from other NATO nations.

The authors of the Handbook are anonymous but the roster of them includes some of the great names in medicine in the NATO countries. It was only through the energy of General Seeley in putting continuous pressure on the various authors that he was able to get them to "come through" with their material and get the first edition published in 1957. Before this edition was published, General Seeley had referred a "working copy" to 40 outstanding surgeons in the United States for their comment before the first edition went to press.

A limited number of copies of the first edition were printed, as it was intended that each member nation of NATO would print the number required for its own forces.

The format and the continuity of text of the first edition were not felt to be all that was desired by the original committee, since it did not have available the services of an experienced medical editor. Again, General Seeley was appointed Chairman of the committee to get out the U. S. edition. Representatives of the three Armed Services were on his committee. However, Col. Joseph R.

Shaeffer, MC, USA, Consultant on Medical Care in Disaster, and Miss Elizabeth M. McFetridge, of the Historical Unit. U. S. Army Medical Service, who monitored the editing, were responsible for largely rewriting the first edition and changing its format so as to produce the very attractive and easily read U. S. edition published in 1958. This edition is so attractive and so logical in its headings that it is hoped that the other NATO nations will follow the example of the U. S. Committee when they republish the 1957 edition, which due to its multiple authorship lacked continuity and also had an unattractive format. Such a Handbook did not lend itself to easy reading. Besides, the edition was too large to form a handy pocket manual, a fault corrected in the U. S. edition.

The necessity for such a Handbook is obvious. In wartime there must be uniformity of action among the armed forces of all the member nations of NATO. Nationals of any of the member nations are apt to fall into allied hands. They should be treated uniformly in the first echelons, no matter what nation is treating them, so that when they progress to another echelon, probably under the doctors of another power, there will be consistent uniform continuity of treatment. The NATO manual, if followed, will effect such a desirable consummation.

Other manuals in other wars have been produced. Some of them have been excellent. As a rule they have gone through one edition only, have become obsolete, and have been allowed to fall into innocuous desuetude. There is promise that the present Handbook will not suffer the fate of its predecessors. NATO has promised to revise it and bring it up to date in five years. It is hoped that there will be constant subsequent revisions. Almost every war has seen advances in military surgery. As a rule these advances have been forgotten before the next war comes



along and have had to be learned again the hard way. Maybe for once we have learned by experience not to repeat this sad succession of events.

Military medicine differs from civil medicine in that in the early stages, at any rate, it is invariably carried out during the confusion of combat. Only training and preparation can bring order out of chaos. Experience has shown us, however, that this can be done. The present Handbook very properly states that "The basis of success in military medicine in the combat zone is an organized team, each member of which has been trained to accept the responsibilities of his assigned position and to be prepared to move to a new station, with different responsibilities, as new situations develop."

The possibility of atomic warfare makes absolutely imperative the necessity for adequate preparation of the entire medical profession long in advance of the disaster. In such an event there will undoubtedly be a shortage of doctors at the point of catastrophe. The disparity between the medical workload and the medical personnel and equipment available will be tremendous. Nothing but adequate medical planning, both military and civilian, will lessen the confusion that is bound to exist and make at all possible a modicum of efficiency in handling the casualties. We are living in a generation in which we have got to stop thinking in terms of separating the military doctor from the civilian doctor. Doctors in the time all of us are now living will be slipping in and out of uniform frequently, in order to meet the exigencies of the situation. All of us must bear in mind our responsibility should a mass disaster strike us. It is appropriate that at the end of each chapter of this Handbook, there are brief comments on the management of mass casualties.

The object of this Handbook is to insure that the best possible medical care is given to every member of the allied fighting forces whenever he becomes a medical responsibility because of injury. The Handbook deals with the care of casualties through the first three echelons only. These are the battalion

aid station, the clearing station, and the field or evacuation hospital. These are the echelons in which the most confusion is apt to occur, and in which the most careful planning and uniformity of action is needed. It makes no attempt to describe treatment in the fourth echelon the general hospital—in which there is more time for calculated and deliberate action and where more leeway can be given as to choice of procedure.

Many of us have seen the confusion that has existed in past wars under the impact of a heavy load of casualties. This is peanuts as compared to what might happen in atomic warfare. We all know the confusion that is caused when three or four badly burned cases are admitted to a civilian hospital. It puts a demand on personnel, blood, and other supplies. This is a miniature disruption compared with what takes place in ordinary warfare and infinitesimal as compared with what takes place in atomic warfare.

This Handbook, then, gives in detail the treatment of every type of injury that can occur in any kind of warfare—normal (so-called), chemical, thermonuclear. Besides detailing the care in various types of injuries, it gives specifically the treatment for shock and metabolic disturbances. It also deals specifically with injuries of all the various parts of the body.

The excellence of the book is attested by the fact that professors of surgery in several medical schools have made it required reading in their surgical courses. It has also been approved by the American College of Surgeons' Trauma Committee. We have heard nothing but favorable comments—both civil and military.

There were 54,000 copies in the first printing of the U. S. edition so that each medical officer of the Armed Forces could have a copy gratis. There were also enough copies to provide for medical officers still to be enrolled. We believe it to be the obligation of the military doctor to be a missionary for this Handbook. In all his contacts with the profession, both civil and military, he should constantly stress the importance of the Handbook and sing its praises so far as or-

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ganization and contents are concerned.

Furthermore, we believe that every doctor in every NATO country should have a copy of it. In case of mass disaster every doctor, both civil and military, in the affected area will be involved—and not superficially either, but up to his ears. The Handbook may be obtained from the U. S. Government Printing Office, Washington, D.C., for \$2.25. Every doctor should become familiar with the initial treatment for the various types of injuries which he may encounter. In order to be able to refresh his memory when the disaster comes, he should keep it in a handy place, either in his office or in his bag, so as to refresh his memory on the spot when the emergency occurs. The described methods of treatment for the various injuries are concise and to the point. With the book at hand, anyone's memory can be refreshed in a very few minutes. The Handbook is small and easy to carry any place.

Furthermore, it should be pointed out that the Handbook is not copyrighted. Anyone may reprint any part of it without permission. Editors of medical journals should bring it to the attention of their subscribers and quote appropriate excerpts from the text.

*Ad astro per aspera!*

## Autobiography of Abraham Lincoln

**I** WAS born February 12, 1809, in Hardin Co., Ky. My parents were both born in Virginia, of undistinguished families—second families, perhaps I should say. My mother, who died in my tenth year, was of a family of the name of Hanks, some of whom now reside in Adams Co., and others in Mason Co., Ill. My paternal grandfather, Abraham Lincoln, emigrated from Rockingham Co., Va., to Kentucky, about 1781 or 1782, where, a year or two later, he was killed by Indians, not in battle, but by stealth, when he was laboring to open a farm in the forest. His ancestors, who were Quakers, went to Virginia, from Berks Co.,

Pa. An effort to identify them with the New England family of the same name ended in nothing more definite than a similarity of Christian names in both families, such as Enoch, Levi, Mordecai, Solomon, Abraham, and the like.

My father, at the death of his father, was but six years of age, and grew up literally without any education. He removed from Kentucky to what is now Spencer Co., Ind., in my eighth year. We reached our new home about the time the State came into the Union. It was a wild region, with many bears and other wild animals still in the woods. There I grew up. There were some schools, so-called, but no qualification was ever required of a teacher beyond "readin', writin', and cipherin'", to the rule of three." If a straggler, who understood Latin, happened to sojourn in the neighborhood, he was looked upon as a wizard. There was absolutely nothing to excite ambition for education. Of course, when I came of age I did not know much. Still, somehow, I could read, write, and cipher to the rule of three, but that was all. I have not been to school since. The little advance I now have upon this store of education I have picked up from time to time under the pressure of necessity.

I was raised to farm work, at which I continued till I was twenty-two. At twenty-one I came to Illinois, and passed the first year in Macon County. Then I got to New Salem, at that time in Sangamon, now Menard County, where I remained a year as a sort of clerk in a store. Then came the Black Hawk War, and I was elected a captain of volunteers—a success which gave me more pleasure than I have had since. I went into the campaign, was elected, ran for Legislature the same year (1832), and was beaten—the only time I have ever been beaten by the people. The next and three succeeding biennial elections I was elected to the Legislature. I was not a candidate afterward. During the legislative period I had studied law, and removed to Springfield to practice it. In 1846 I was elected to the Lower House of Congress. Was not a candidate for re-election. From 1849 to 1854, both inclusive,

practiced law more assiduously than ever before. Always a Whig in politics, and generally on the Whig electoral ticket, making active canvasses. I was losing interest in politics when the repeal of the Missouri Compromise aroused me again. What I have done since then is pretty well known.

If any personal description of me is thought desirable, it may be said I am in

height six feet four inches, nearly; lean in flesh, weighing, on an average, one hundred and eighty pounds; dark complexion with coarse black hair and gray eyes no other marks or brands recollected.

Yours very truly,

A. Lincoln.

Above was written at the request of J. W. Fell of Springfield, Ill., December 20, 1859.



THE DIVINE WIND. By Rikihei Inoguchi and Tadashi Nakajima and Roger Pineau. U. S. Naval Institute, Annapolis. Price \$4.50.

In a park in Fukuoka, Kyushu, Japan, are two huge statues commemorating an event that took place in 1281 when Kubla Khan attempted to invade Japan. The Divine Wind at that time scattered the Chinese invasion ships and Japan was saved.

This book, *The Divine Wind*, is the story of the Kamikaze, the suicide pilots of the Japanese who were responsible for the sinking of 34 and damaging of 288 American ships (all types). The two Japanese authors were closely connected with the Special Attack Corps which had its initiation in the Philippines by Admiral Onishi who on the surrender of Japan committed hari-kari.

The American co-author was a member of the U. S. Strategic Bombing Survey in Japan. He has a knowledge of the Japanese language and the Japanese which was of great value in presenting this book to the public.

We have often asked, "How could men do it, knowing there was no escape from death?" This book gives us the emotional reaction of those who conceived the idea of the Kamikaze Corps and of those who carried out the orders. Last letters from

the pilots to parents show the great devotion they had to family and Emperor.

This is an interesting and revealing work.

NAUTILUS 90 NORTH. By Commander William R. Anderson, U. S. Navy, with Clay Blair, Jr. The World Publishing Co., Cleveland and New York. Price \$3.95.

A Southerner, Commander William R. Anderson, captain of the *Nautilus* travels with his crew to the North Pole, not by dog team, or airplane, but by the unheard of method of going under the ice.

Top Secret orders, an inspection by Rear Admiral H. G. Rickover, the designer of the submarine, and a final telephone call to Washington put the vessel underway—to England under the North Pole.

The first attempt to reach the Pole (June 1958) was unsuccessful. Undaunted, a second attempt was made in July. On August 3 the *Nautilus* arrived at 90° North, giving the U. S. Navy its third "First" at the North Pole: by ground (ice), then by air; now by water.

This is an exciting story of courageous men confined in an atomic powered submarine. High morale, optimism, wit, marked the crew for success of Operation "Sunshine."

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## Around the World

(Ser. III, No. 4)

By

CLAUDIUS F. MAYER, M.D.

**D**ALMATIA is the most infested with *echinococcosis* among the Yugoslavian provinces according to the health authorities of this Balkan country where eradication of the hydatid disease is a special problem. Yugoslavia has many dogs, and they become infected from sick animals (bovids), and will transmit the worm to man. No exact figures are available about the extension of echinococcosis in that country but the spread is large enough to justify the establishment of special centers in the local bureaus of public health. One of such centers just reported that the ratio of infestation is one case of echinococcosis at every 304 autopsies (0.32%). The annual average of the hospitalized cases is on the increase. In Dalmatia, this helminthosis is numerically close to tuberculosis or typhus fever. Cuti-reactions revealed that among 1,321 Dalmatians, 125 (or 9.3%) were harboring the worm. The situation is not better in the other countries of the Balkan Peninsula. Thus, Greece is still heavily infested with *hydatid* disease (about 7.37 per 1,000).

At a recent meeting of the Yugoslavian Malaria Commission it was reported that the intensive fight against the disease resulted in great reduction of the *morbidity rate from malaria*, especially in the northern areas of the country. During 1957, only 6 cases of malaria were registered in Croatia and Slovenia, 5 in Bosnia-Herzegovina, 16 in Crna Gora, 50 in Serbia proper, but Macedonia reported 1,591 malarial cases. Here are about 160 villages, with a total population of 1,150,000 (NOTE: In March and April, 1958, Macedonia reported only 6 cases of malaria, while Serbia added 17 more to its figure). Spraying with DDT is the chief means in the local antimalarial fight. A 25% emulsion of the drug is used so that about

one gram of pure substance is left as residue over a square meter area. In Yugoslavia, about 190 tons of the emulsion were used a year to combat mosquitoes at a cost of about 50 million dinars in this fight against malaria.

From Soviet Russia's point of view, *Czechoslovakia* is the most obedient and most exemplary state among the satellites behind the "not-so-iron" curtain. Its people seem to be the most satisfied under the Soviet domination. The *complete Sovietization* of the country progressed very rapidly during the last ten years. The complete reformation according to Soviet pattern also included the field of public health and medicine (as excellently described by Urban in the *Zeitschrift für Ostforschung*). *State medicine* had been already introduced before the February 1948 coup d'état of the Communists. All therapeutic institutions, sanatoria, and bathing health resorts as well as the field of preventive medical care had been appropriated by the State. The *drug industry* also became a State monopoly. Yet, during 1945-51, there still remained a large amount of individualistic medical and health work. In 1951 however, after a meeting of Czech and Soviet experts, it was decided to go all the way with the Soviet, and in the following years the Russians sent their emissaries as advisers, and put them in the Czech Ministry of Health. In the same year, the *medical affairs of Czechoslovakia* were brought under a single administration. Following the patterns of the Russian polyclinics, health centers were established in the cities, providing one center for every 30-40 thousand inhabitants. There are also dispensaries for preventive work. In 1954, the people were arranged in health groups of 4,000-6,000 persons, to be taken care of by a single practitioner. In Praha, 199 such groups were created, but, due to

the shortage of practitioners, more people (8,000) had to be put under one doctor's supervision in that metropolis.

The practical care of the sick is mostly carried out by the hospitals the absolute number of which is not known. The Czech minister of public health stated that in 1954 there were 6.83 general-hospital beds available for 1,000 inhabitants (18.6 beds for care of one physician, and 5.2 beds for care of one nurse). The growth of counselling centers for maternity and child welfare shows a substantially high rate, owing to the general trend to have all deliveries in hospitals. In 1954, 73.3% of the newborn were delivered in hospitals (only 18.5% in 1937). The net result is a very great reduction in the mortality of newborn babies (48.3 per 1,000 in 1937; 18.3 per 1,000 in 1954) and of mothers (4.74 per 1,000 in 1937; 0.70 per 1,000 in 1954).

Many Czech industrial establishments are now provided with some type of plant station for occupational health according to the number of employees (nursing post for less than 200 employees; medical station for less than 400 persons; regional industrial center or outpatient department; county industrial center; hospitals; 3 night sanatoria; cradles, etc.). The public health organization is further based upon the available physicians. In 1947, the number of registered physicians in Czechoslovakia was 9,959; in 1951, 13,514; in 1954, 16,259 (estimated); in 1955, perhaps about 18,000 (which is however a very questionable figure). The total of professional "health personnel," including nurses, etc., was 95,000 in 1954.

The medical behavior and practice is regulated by an order of 13 February 1956. This regulation determines the working place, and puts certain special obligations upon the doctors; if they would not obey they would be suspended from practice. Physicians are considered as other workmen, and they must belong to the trade union of health personnel. Thus, the social status of the Czechoslovak physician has completely changed. Today, he is but another government employee, and the private practitioner is now practically wiped

out. The monthly salary of a starting general practitioner is 1,000 Cz. crowns; of an older assistant, 1,500 crowns; of a specialist about 2,400 crowns; and of a country doctor some more.

Medical education changed thoroughly after the law of the general reform of higher education (18 May 1950). Everything in that country is Sovietized; especially, according to Soviet practice, in addition to the medical faculties, special faculties were established for pediatrics and for public health. The number of medical schools was also increased. New medical academies, independent of the universities, were also created in Pilsen, Olmütz (Palacky University), Königgrätz (Military Medical Academy), and Kassa, the former Hungarian town (Comenius University). In 1954, about 8,600 students were matriculated in these schools.

At these schools much time is taken up by teaching *Marxism-Leninism*, and by military training. Since January 1954, the medical schools do not graduate M.D.'s any longer; they only give the title of "graduate physician." In the future, as everywhere under the Soviet system, the title of "doctor" will be given to medical scholars only. This was one of the sore points which provoked the demonstration of the Czech students in May 1956.

The contents of present day Czechoslovak medicine is Soviet medicine. Even the older doctors are required to take regular post-graduate courses to become acquainted with the political and medical ideology of the Soviet. Anything else is considered "reactionary idealism, including metaphysics, vitalism, objectivism, holism, psychosomatics, and Freudism." The Pavlovian doctrine is promoted everywhere, and there is an active campaign against the vitalistic school of the Czech physiologists Mareš, Syllaba, and others. On a so-called *Ideological Conference* (March 1952) held in Brünn, the Director of the Biological Institute attacked the genetic theory of Weismann and Morgan, and the "American Science" as a whole. (The genetic theory of Morgan is under continuous attack by the Soviet, and one of the out-

standing problems of the Soviet Academy of Sciences for 1959 is the destruction of "*Morganiism*."

Since 1952, the coordination of *medical research in Czechoslovakia* is in the hand of a Science Council which functions within the Health Ministry. It includes the directors of the ten or fifteen so-called research institutes. Since 1949, the scholarly physicians are members of the *Purkyně Society* which has about 30 sections for different specialties. There is a *Central Institute for Health Documentation* for search of the literature and for reference work (This is also usual in the satellite countries.) It established a Central Catalogue that shows the holdings of all important libraries of Czechoslovakia (similar to our Union Catalog). Since 1953, the business of medical publishing also has been in the hands of the state. Some 30 medical journals are published in the country.

The *Czech doctors* are generally dissatisfied because *their economic level* is now deeply depressed. The first result of it is an indifference toward the patients. Moreover, young and inexperienced physicians are given responsible independent positions in the hospitals. The industrial physicians are required to be loyal to the management rather than to the sick. The chronic shortage in drugs and medical equipment is also a heavy obstacle to medical practice. Since the patients get free medicaments, there is much waste at the State's expense, as it is in England. Equipment often breaks down in unskilled hands, and even the minor repairs need many months. The greatest handicap of medicine in Czechoslovakia is that it is forcefully kept in *bondage of Soviet medicine*, and any non-Soviet opinion is declared reactionary.

The *Belgian Military Medical and Pharmaceutical Society* held a symposium on the physiology of *physical exertion*, a problem which is of great interest to the medical service of the military forces and to everyone who is interested in the physical training of youth. The various lectures brought out the long-established knowledge that moderation is the best in everything. When we keep our-

selves within the fixed limits of our framework, our body will do a series of *remarkable functional adaptations* and will use compensatory mechanisms which permit us to maintain a well adjusted activity for a long time. But, if the limits are exceeded, important irregularities or defective mechanisms appear which will soon lead to incapacity. Should we then never go out of the limits of our homeostasis? Well, the maximum effort is not necessarily harmful, since recovery is fast and often complete (in the heart, the kidneys, muscles, etc.)

The *Lambeth Conference* is a congregation of Anglican bishops. At a recent conference the bishops discussed the *problems of family planning*. Unquestionably, the main purpose of marriage is the procreation of children, yet, "family planning, in such a way as they are mutually acceptable to husband and wife in Christian conscience, and secure from the corruption of sensuality and selfishness is a right and important factor in *Christian family life*." The conference approved the growth of marriage guidance councils, and encouraged the priests to develop as counsellors. Where the increase of population is dangerous for survival, control of the population should be allowed, said the conference, but abortion, infanticide, morally unacceptable methods, and government-enforced sterilization are condemned as much as artificial insemination by anyone other than the husband.

The results of a survey on the *laws and regulations of medical specialization*, valid in the various countries of the world, were published by the World Health Organization. In some countries, as in the USA, in the Philippines, or in Switzerland, or in Mexico, there are no laws about the specialization, but standards have been established by the medical profession itself. There is no agreement among the countries what actually a *medical "specialist"* is. Where the law has prescribed the amount of training required from an expert in a branch of medicine, the number of *recognized specialties* are also defined. But, while in Austria only 16 specialties are recognized, in the neighboring Czechoslovakia a

physician may qualify in 20 main, and 45 sub-branches. Some of the *less frequently seen* medical specialties are: hematology (Costa Rica, and Luxembourg), hygiene of seafarers (Poland), youth health (Czechoslovakia), phoniatriy (Czechoslovakia, and France), haemobiology (France), aviation medicine (Spain). Rules are also different about where the training in the specialty may be acquired. Specialists either must pass an examination, or they must be certified by a board, or both. There are many problems in connection with specialization which still require solution.

At a *Conference on Air Pollution* held some months ago in Milano (8-14 Nov., 1957), several examples were mentioned how the comfort and the well-being of modern communities is destroyed by the *progressive industrialization* of the world. In Belgium, deaths from chronic bronchitis are higher in the industrial provinces of Liège, Namur and Hainault; in the Thames Valley, smoke-polluted fog was responsible for almost 4,000 deaths in four days in December 1952. The health of school children is bad in some districts of Poland where smelting and similar industries are concentrated. It was estimated that a *shale-oil factory in Sweden* gives off roughly 12 tons of dust, 200 tons of sulfur dioxide, and 1200 m<sup>3</sup> hydrogen sulfite in 24 hours. People near this factory suffer more from fatigue, discomfort, minor illnesses and respiratory troubles than people living remotely from this poison factory. The life of plants and animals is also affected by such industrial by-products, for instance in the neighborhood of the *aluminum factories in Switzerland*. How can people protect themselves against such annoyance and health hazards? Of course, by legislative action only, or by court suits. The difficulty is that conclusive proof is necessary, and this would require some sort of systematic measurement of pollution of the air in all countries. New industries should be required to check the sources of air pollution by suitable engineering measures.

At a late meeting of the British Association for the Advancement of Science, the

president of the Psychology Section, Doctor Maule, pointed out that as industrialization proceeded with great rapidity there was but little attention paid to the personal and *human needs of the industrial worker*. Industrialists were more concerned with the new technics of engineering and with new machinery than they were with people. There were however individual attempts of appreciation of the workers' problems. Later also, it was only in regard to hours of work that there was any serious thought about the relationship between the worker, his work and his working efficiency. Only after World War I was the *Industrial Fatigue Board* set up in England, which for the next 30 years, carried out research and published its findings. It is the work of this Board which makes the foundation of *modern industrial psychology*. Between the two wars, the emphasis of the research somewhat changed, especially under the influence of the U. S. psychologists. Since the end of the war, further improvements were made in the application of psychological principles to industrial problems. The relationship of the worker to his work, to his environment, to his co-workers and superiors is now better and better understood, and problems of industrial management can be thus solved.

At the University of *Helsinki*, an important meeting took place last June which discussed the possibilities of *rehabilitating the victims of brain injuries*. The meeting was organized by a number of agencies, including the World Federation of Veterans, and the WHO. One reason to hold the conference in Finland was that the Finns, under the leadership of *Prof. Niilo Mäki*, the great neurosurgeon, have been the most successful in improving the fate of the brain-injured. Statistics of the brain injuries of the war show that the number of the unfortunates is enormous: 90,000 in Western Germany, 4,000 in Finland, 25,000 in Great Britain, etc., probably 250,000 all together. Neurosurgery itself can do much, especially in modern times when exact localization of the injury is made possible by means of radioactive substances injected into the cerebral

arteries. The *re-education work* is however much more important, and the Finns started in this work soon after their Karelian War in 1942. Prof. Mäki has treated more than 700 brain injured, and after the re-education procedure less than 10% remained totally disabled. Many were able to resume their former jobs.

Examination of *recruits at the Karolinska Hospital's* medical clinic showed that persons who passed through Asian influenza often had a type of myocarditis which could be detected by electrocardiography only. Neither clinical symptoms nor radiography revealed anything abnormal with the heart. Whether the heart condition was actually a result of influenza is questionable, especially in view of the former observation that healthy Swedish recruits also showed changes in their electrocardiograms suggestive of *asymptomatic myocarditis*.

A member of the Cairo University Faculty of Medicine wondered what the influence of the *Egyptian climate* may be upon *hypertension*. He measured the blood pressure of 1,500 persons over 40 years of age, the casual pressure when the patient was sitting. He found the hypertension quite prevalent among Egyptians as a race; moreover, much of the hypertension here is of renal origin, perhaps as a result of the wide-spread bilharziasis.

Nearly one million *Arab refugees from Israel* are now living in the Gaza Strip, in Jordan, Lebanon, and Syria. Ten years after their exodus from their homes in Palestine, they are mainly the dependents of the United Nations which has a special agency to provide them with food, shelter, welfare services, and education. The agency also operates a large

and comprehensive health service under direction of the WHO. Provisions were made in all camps for clean water supply, efficient garbage disposal system, and sewage arrangements. Last year one fourth of the refugees were inoculated against typhoid, almost half of them against smallpox, and a number of children against diphtheria and pertussis. The Swiss government donated a generous sum to the *tuberculosis clinics at Nablus and Gaza* (total of 250 beds) for the treatment of tuberculosis among these refugees. In the sanatoria, modern radiological equipment was also installed by Swiss technicians. Surgical instruments were also donated to the organization called "*Charitas*" which takes care of the Arab refugees in and around Bethlehem.

A Johannesburg physician (Levin) complained recently that the "*art of stool-gazing*" is rapidly passing into oblivion, though until recently, infants' stools had been studied with a devotion paralleled only by the Babylonians' zeal in studying the liver and divining the future therefrom. Even in 1950, pediatric residents used to congregate once a week in the sluice-room where infants were represented by stool specimens in labelled diapers; there were exhibited, spread out with spatula, studied with solemnity as to color, curds, and consistency, and decision was made for a change of the infant's diet. Now! the seventy years of stool-gazing are over. Mothers and some nurses are still remaining as devotees of the art, but the views of the doctors have changed, and they evince very little interest in baby's stools. They leave it to the biochemist and the bacteriologist, and the *clinical cult of coprology* is now just a bad memory. . . . *Multa paucis!*





# The Sir Henry Wellcome Medal and Prize

## COMPETITION FOR 1959

THE competition is open to all medical department officers, former such officers, of the Army, Navy, Air Force, Public Health Service, Veterans Administration, The National Guard and the Reserves of the United States, commissioned officers of foreign military services, and all members of the Association, except that no person shall be eligible for a second award of this medal and prize and no paper previously published will be accepted.

*The award for 1959, a medal, a scroll, and a cash prize of \$500, will be given for the paper selected by a committee composed of the Association's vice-presidents which reports on the most useful original investigation in the field of military medicine. The widest latitude is given this competition, so that it may be open to all components of the membership of the Association. Appropriate subjects may be found in the theory and practice of medicine, dentistry, veterinary medicine, nursing and sanitation. The material presented may be the result of laboratory work or of field experience. Certain weight will be given to the amount and quality of the original work involved, but relative value to military medicine as a whole will be the determining factor.*

Each competitor must furnish six copies of his paper which must not be signed with the true name of the author, but are to be identified by a *nom de plume* or distinctive device. These must be forwarded to the Secretary of the Association of Military Surgeons of the United States, Suite 718, 1726 Eye St. N.W., Washington 6, D.C., so as to arrive at a date not later than 20 June 1959, and must be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title and address. The length of the essays is fixed between a maximum of 10,000 words and a minimum of 3000 words. After the winning paper has been selected the envelope accompanying the winning essay or report will be opened by the Secretary of the Association and the name of the successful contestant announced by him. The winning essay or report becomes the property of the Association, and will be published in *MILITARY MEDICINE*. Should the Board of Award see fit to designate any paper for "first honorable mention" the Executive Council may award the writer life membership in The Association of Military Surgeons, and his essay will then also become the property of the Association.

## NOTES

Timely items of general interest are accepted for these columns. Deadline is 3rd of month preceding month of issue.

### Department of Defense

*Ass't Secretary (Health & Medical)*—HON.

FRANK B. BERRY, M.D.

*Deputy Ass't Sec'y*—HON. EDW. H. CUSHING, M.D.

#### SELECTIVE SERVICE

A call for 9,000 men during February has been made for assignment to the Army. This is the same number as was requested for January.

#### DOCTOR DRAFT

Will the doctor draft act which is due to expire June 30 be extended? Probably so. The Department of Defense may have to use this act to fill vacancies in the Medical Services of the Army, Navy, and Air Force.

#### AVIATION PATHOLOGY COMMITTEE

The Joint Committee on Aviation Pathology, established in November 1955 by a Department of Defense Directive for the investigation of the pathology of aircraft accident fatalities, recently elected officers for 1959.

They are Captain Carl E. Wilbur, MC, USN, chairman, and Captain Murray W. Ballenger, MC, USN, secretary.

The Armed Forces Institute of Pathology, Washington, D.C., is used as the central coordinating facility for the activities of the Committee.

#### FORENSIC PATHOLOGY

A Registry of Forensic Pathology has been established at the Armed Forces Insti-

tute of Pathology, Washington, D.C., as announced recently by Captain W. M. Silliphant, MC, USN, its Director.

The basic objective of the new registry is the collection of well worked-up and well documented medicolegal cases to be used as a reservoir for teaching and research. Only selected cases of medicolegal interest contributed by a qualified pathologist will be registered. Cases are now being accepted for registration.

A six-month fellowship in forensic pathology at the Armed Forces Institute of Pathology has been provided by the College of American Pathologists.

### Army

*Surgeon General*—MAJ. GEN. SILAS B. HAYS

*Deputy Surg. Gen.*—MAJ. GEN. JAMES P. COONEY

#### COMMANDS WILLIAM BEAUMONT HOSPITAL

Brigadier General Clinton S. Lyter, MC, who was promoted to that grade on December 4, 1958 has taken over command of the William Beaumont Army Hospital at El Paso, Texas.

General Lyter, a native of Carbondale, Kansas, received his B.S. degree from Kansas University in 1927, and his medical degree from the Kansas University School of Medicine in 1929. He entered the Army Medical Corps and specialized in surgery. During World War II he became commanding officer of the First Auxiliary Surgical Group and served that unit in the States and in the European Theater of Operations until September 1945. In 1950 he returned to Europe as chief consultant in surgery for the U. S. Army European Command, and upon his return to the United States in 1953 was assigned to Fitzsimons Army Hospital.

## KIMBROUGH PLAQUE

A bronze plaque commemorating the late Colonel James C. Kimbrough was unveiled recently in the lobby of the Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.

The commanding general of the center, Major General Leonard D. Heaton spoke briefly eulogizing the noted Army urologist. Mrs. Pauline Kimbrough, widow of the colonel, responded and expressed her appreciation for the memorial.

Colonel Kimbrough, a native of Tennessee, entered the Army Medical Corps in May 1917 and although retired remained on duty as a consultant in urology at the Walter Reed Army Medical Center. He died in 1956 at the age of 67.

## RECEIVES CARMACK MEDAL

First Lieutenant William G. Pfeiffer of Chicago recently received the Carmack Medal which is awarded to the Medical Service Corps officer with the highest scholastic rating in a course for company-level officers at the Army Medical Service School.

Lieutenant Pfeiffer has been assigned to Headquarters, Brooke Army Medical Center.

## PROMOTED

The Commanding Officer of the Army Environmental Health Laboratory and consultant to the Surgeon General of the Army in the field of occupational medicine, Edward J. Dehne, has been promoted to the rank of colonel.

A graduate of the University of Oregon Medical School in 1937, Colonel Dehne has received both his Master and Doctorate of Public Health degrees at Johns Hopkins University. He is a certified specialist member of the American Board of Preventive Medicine and the Founders' Group of Occupational Medicine.

## HONORED

Colonel George W. Hunter, III (Ret.) now associated with the University of Florida Medical School, and Colonel Dwight

M. Kuhns (Ret.), now with the Medical Department of the United Mine Workers, were honored by the Cuban Government at the annual meeting of the National Academy of Sciences of Havana on December 4, 1958 when they were decorated in the grade of "Official" in the Order of Carlos J. Finlay.

## EMERGENCY MEDICAL PACKET

An emergency medical packet for use in a mass casualty situation—called Phase I Emergency Medical Treatment Unit—has been designed to meet conditions immediately following a military disaster. The packet contains 23 items and will provide medical material for treatment of approximately 100 casualties for about 72 hours.

Representatives of the Assistant Secretary of Defense (Health and Medical) and a professional supply representative from each of the military departments selected the items to be included. The packet was then developed at the tri-service Medical Equipment Development Laboratory, Fort Totten, New York and at the Army Medical Supply Depot, Louisville, Kentucky.

It has been pointed out that this is not a first aid packet but goes beyond that point. During a period following a disaster there is a shortage of professional help and during this period the non-professional personnel may have to assume a great part of the care of the injured.

## WIND CHILL TABLE

A Wind Chill Table designed to gauge in advance the severity of the weather, has been developed at the U. S. Army Medical Research Laboratory, Fort Knox, Kentucky.

The table shows some astounding facts. For example, if the temperature to be expected is about 35 degrees Fahrenheit and the expected wind velocity is 20 miles per hour, the effect on exposed flesh is the same as 38 degrees below zero with no wind.

Wind chill is one of the most important factors in the production of cold injury. Good planning on the part of commanders will include a study of the weather and with this chart for guidance during the winter

months proper protection of troops can be made thus preventing cold injury.

#### JAPANESE ENCEPHALITIS

For some years now we have known that the mosquito *Culex tritaeniorhynchus* was a carrier of the dangerous Japanese B encephalitis virus. Now work at the Walter Reed Army Institute of Research, Washington, D.C., shows that the Malayan mosquito, *Culex gelidus* is also a carrier of that virus and others not previously known.

In 1954 scientists of the U. S. Army Medical Research Unit in Malaya started a project aimed at finding vectors of Japanese encephalitis virus and determining whether or not mosquitoes carried the agents of fevers of previously undetermined origin.

In 1956, Major Herbert C. Barnett and Dr. Douglas J. Gould of the Institute went to Malaya to attempt colonization of the mosquito. They brought back living mosquitoes and larvae, which were the forerunner of the present *Culex gelidus* colony that now thrives at Walter Reed.

It is hoped that preventive measures against Japanese encephalitis and other viruses carried by these tropical mosquitoes can be developed.

#### CHANGE OF COMMAND

In a change of command ceremony at Fitzsimons Army Hospital, Denver, Colorado,



U. S. Army Photo

(L to R) COL. R. H. JONES (former commander); COL. R. C. ZALESKY (Sector Commander); and LT. COL. A. R. BUCHANAN (new commander).

recently the command of the 156th General Hospital (Reserve) was transferred to Lt. Colonel Archibald R. Buchanan, MC, USAR, who is professor of anatomy and head of the Department of Anatomy of the Colorado University Medical Center at Denver.

Colonel Rodney H. Jones, MC, USAR, former commander and a physician at the Veterans Administration Hospital, Denver, is leaving the Unit.

#### CHANGE OF COMMAND

At a recent ceremony held at the Upshur Street Reserve Center, Washington, D.C., Colonel Joseph J. Wallace, MC, USAR, re-



At change of Command ceremony—Col. J. J. WALLACE (left) and COL. R. M. VAN MATRE.

linquished Command of the 354th General Hospital (Reserve) to Colonel Reber M. Van Matre, MC, USAR.

Colonel Wallace is now the Deputy Commander of the 805th Hospital Center (Reserve) of which Brig. General Frank E. Wilson is the Commander.

At the same ceremony, Lt. Colonel Arthur Modin was appointed to replace Lt. Colonel Tommy T. Rose who was moved to the position of Executive Officer of the 805th Hospital Center.

#### FORTS TO CLOSE

Fort Polk, La., Fort Chaffee, Ark., and Fort Miles, N.J., are expected to be closed before the summer months.

## RETIRED

Colonel Harry R. Lancaster, VC, who was Chief of the Meat and Dairy Hygiene Branch, Veterinary Division, Office of the Surgeon General, retired December 31. He has accepted a position as Assistant State Veterinarian for Arizona.

## Navy

*Surgeon General*—REAR ADM. BARTHOLOMEW W. HOGAN

*Deputy Surgeon General*—REAR ADM. BRUCE E. BRADLEY

## TO FLAG RANK

Rear Admiral Allan S. Chrisman, MC, and Rear Admiral Calvin B. Galloway, MC, were appointed to their present ranks on December 1, filling vacancies created that date by the retirements of Rear Admiral French R. Moore, MC, and Rear Admiral Ocie B. Morrison, Jr., MC.

Their selections for the rank of Rear Admiral were approved by the President on July 20, 1958. They will have a date of rank of August 1, 1958.

Rear Admiral Chrisman who is Commanding Officer of the U. S. Naval Hospital, San Diego will have the additional duty as Dis-

trict Medical Officer of the Eleventh Naval District with Headquarters in San Diego.

Rear Admiral Galloway has assumed duties in the Bureau of Medicine and Surgery where he will be the Assistant Chief of the Bureau for Research and Military Medical Specialties

## CHANGE OF COMMAND

Captain Lester J. Pope, Medical Corps, has assumed command of the U. S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland. The former commander of the school, Rear Admiral C. B. Galloway has assumed his duties as Assistant Chief of Research and Military Medical Specialties in the Bureau of Medicine and Surgery.

Captain Pope who is designated a Flight Surgeon, entered the Navy Medical Corps in 1939, and was present in Hawaii at the time of the attack on Pearl Harbor by the Japanese. During the Korean Conflict he served on the USS *Haven* which operated off the coast of Korea and helped treat casualties of the Korean Conflict.

Doctor Pope has done postgraduate work at Cornell University and the University of Pennsylvania. He is a Diplomate of the American Board of Internal Medicine, a Diplomate of the Subspecialty Board of Gastroenterology and a Fellow of the American College of Physicians.

## DR. KARSNER HONORED

At the Annual Meeting of The New York Academy of Sciences recently, the title of Fellow of the New York Academy of Sciences was conferred upon Dr. Howard T. Karsner, Medical Research Advisor to the Surgeon General of the Navy. This honor is bestowed only on a limited number of members who have done outstanding work toward the advancement of science.

## ASSIGNMENT

Captain Edward F. Kline, MC, relieved Captain Gerard B. Creagh, MC, as Commanding Officer of the U. S. Naval Hospital,



Official U. S. Navy Photograph

REAR ADM. THOMAS F. COOPER, MC (left), Commanding Officer National Naval Medical Center, presents REAR ADM. CALVIN B. GALLOWAY, MC (right) with his appointment to flag rank.



Camp Pendleton, California when the latter officer retired on December 1.

#### NEW POSITION

Dr. Henry A. Imus, formerly Assistant to the Director, National Institute of Neurological Diseases and Blindness at the National Institutes of Health in Bethesda, Maryland, has joined the staff of the U. S. Naval School of Aviation Medicine, Pensacola, Florida. His position is Supervisory Psychologist, Department of Psychology and Head, Aviation Psychology Laboratory. He is responsible for the direction and coordination of research on problems related to the selection, training, assessment, and motivation of naval aviators.

#### RESERVE OFFICE RESEARCH SEMINAR

The U. S. Naval School of Aviation Medicine, Pensacola, Florida, will hold the Fourth Annual Research Reserve Seminar in Aviation Medicine for a two week period commencing March 9.

This seminar, sponsored by the Office of Naval Research in conjunction with the Naval Air Training Command and the School of Aviation Medicine, is open to reservists of all services who have an interest in scientific and operational problems of Naval aviation and its role in the conducting of modern warfare. Applications should be made through regular channels.

#### RETIRED

Rear Admiral French R. Moore, MC, who was District Medical Officer of the Fifth Naval District, Norfolk, was placed on the retired list of the Navy on December 1, 1958. He was commissioned in the Medical Corps in 1926 following his graduation from the University of Oregon Medical School.

He was Senior Medical Officer of the Marines at Guadalcanal and Division Surgeon, Second Marine Division at Tarawa. On retirement he was advanced to the rank of Vice Admiral.

Rear Admiral Ocie B. Morrison, Jr., MC, was placed on the retired list on December 1, 1958. He was District Medical Officer in the

Eleventh Naval District, San Diego, at the time of his retirement. He was a graduate of the University of Virginia Medical School in 1925 and entered the Medical Corps of the Navy at that time.

As Senior Medical Officer of the heavy cruiser USS *Chicago* from August 1940 until September 1942, he participated in the Battle of the Coral Sea (May 7-8, 1942) and later served at Guadalcanal, Guam, Palua, Okinawa, and in the advanced party landings in Shanghai and Tientsin, China. On retirement he was advanced to the rank of Vice Admiral.

## Air Force

*Surgeon General*—MAJ. GEN. OLIVER K. NIESS

*Deputy Surg. Gen.*—MAJ. GEN. OLIN F. MCILNAY

#### SPACE MEDICINE

The 10th Anniversary of the founding of the Department of Space Medicine was commemorated at the School of Aviation Medicine, Randolph Air Force Base, Texas on February 9.

The Department was established by Major General Harry G. Armstrong USAF(MC), former Commandant of the School and later Surgeon General of the Air Force. This was the first project of its kind in the world.

Major General Otis O. Benson, Jr., now Commandant of the School of Aviation Medicine invited original members of the Department (now a Division) to the ceremonies. In addition to General Armstrong were: Doctors Hubertus Strughold, Fritz Haber, Heinz Haber, and Konrad J. K. Buettner.

## Public Health Service

*Surgeon General*—LEROY E. BURNEY, M.D.

*Deputy Surg. Gen.*—JOHN D. PORTERFIELD, M.D.

#### HONORED

Doctor Leroy Burney, Surgeon General of the Public Health Service and Doctor A.

Van Zile Hyde of the Public Health Service were honored at the annual meeting of the National Academy of Sciences of Havana, December 4, 1958.

Doctor Burney was presented with the "Grand Cross" in the Order of Carlos J. Finlay.

#### COMMISSIONED CORPS EXAMINATIONS

For Veterinarians, an examination will be held March 31, April 1, 2, and 3. Applications must be in by February 20.

For physicians, dentists, sanitary engineers, clinical psychologists, and biochemists there will be examinations April 21, 22, 23, and 24. Applications must be filed not later than March 6.

For nurses there will be an examination May 12, 13, 14 and 15. Applications must be filed no later than March 27 with the Surgeon General of the Public Health Service.

For further information and application forms write to the Surgeon General, U. S. Public Health Service (P), Washington 25, D.C.

#### VITAL STATISTICS

Records indicate that about 4,248,000 babies were born in 1958 in the United States, a decline of 53,000 from the record high set in 1957. The 1940 figure was 2,559,000.

#### STRONTIUM-90 IN MILK

Levels of radioactive strontium-90 in milk increased during September 1958 in 8 out of 10 sampling stations across the country.

The increases generally were within the range of recent month-to-month fluctuations in radiation levels among the different sampling stations.

All samples remained well below the levels currently considered by the National Committee on Radiation Protection and Measurements to be permissible for consumption over an entire lifetime.

Among the 10 stations, the September count for strontium-90 was highest at St. Louis—15.4 micromicrocuries per liter as

compared with 14.1 in August; 18.7 in July and 14.8 in June. Sacramento reported the lowest level in September.

#### POLIO

The year 1958 showed an increase in the number of paralytic polio cases. For the 52 weeks there were 3,083 cases, an increase of 921 cases over the same period for 1957.

Increased emphasis must be given to vaccination for poliomyelitis if the upward trend of paralytic cases is to be held in check. The winter and spring months are the months to accomplish this vaccination so immunity can be effected before the epidemic period which comes during July, August, and September.

VACCINATE NOW FOR POLIO.

#### GIVES LECTURE

A lecture on "The Abnormal Personalities" was delivered by Dr. Dominick J. Lacovara at the Seventh Annual Attorney General's Training Series of the U. S. Department of Justice which was held recently at the Border Patrol Academy in El Paso, Texas.

The lecture emphasized emotional development, the recognition and management of abnormal persons and mental disorders most often encountered by law officers.

Dr. Lacovara, a Senior Surgeon of the Public Health Service, is Chief Medical Officer and Chief, of the Psychiatric Program at the Federal Correctional Institution, Ashland, Kentucky.

After the lecture Mr. Homer H. Henry, Attorney, Department of Justice, representing the Attorney General who extended the invitation to Dr. Lacovara, presented him with a trophy.

#### PERSONAL NOTE

Alfred M. Pommer, Ph.D., Kensington, Md., has been promoted to Scientist in the Inactive Reserve Corps of the Public Health Service. He has been appointed as assistant in Pediatrics, Georgetown University, Washington, D.C.

## AIR POLLUTION

More and more attention is being given to the matter of air pollution. Coming in for a good share of that attention are the exhaust fumes from automobiles. Increasing emphasis will be placed on this problem.

The Robert A. Taft Sanitary Engineering Center in Cincinnati which is operated by the Public Health Service is the center for much of this research work.

Increasingly numbers of people are going to the cities. The majority of these cities are having redevelopment programs to replace old buildings with modern tall buildings thus leading to further restrictions of air movement which must be depended on for the removal of noxious gases.

An additional problem, of course, is the ever increasing number of automobiles, and these contribute to traffic problems. Traffic snarls with motors running and throwing noxious gases into that layer of air which we all must breathe certainly must have some effect on the human being.

## MULTIPLE SCLEROSIS PAMPHLET

A pamphlet (PHS No. 621) entitled "Multiple Sclerosis—Hope Through Research" has been issued by the Public Health Service.

While there is no known cure or fully effective treatment for multiple sclerosis new techniques are mentioned which make possible early diagnosis of the disease.

One of the recent advances reported in the leaflet is a new understanding of myelin through biochemical research. Scientists have now discovered the specific manner in which one of the essential compounds of myelin, sphingosine, is formed in the body and are now able to produce this substance in the laboratory.

Single free copies may be obtained from the National Institute of Neurological Diseases and Blindness, Bethesda 14, Md., or 100 copies for \$3.00 from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

## Veterans Administration

*Chief Medical Director*—WILLIAM S. MIDLETON, M.D.

*Deputy Chief Med. Dir.*—R. A. WOLFORD, M.D.

## APPOINTMENT

Ray Q. Bumgarner has been appointed as manager of the Veterans Administration at Dayton, Ohio. He served in the Army from 1943 to 1946 as adjutant and as executive officer of the Station Hospital at Camp Patrick Henry, Va., and on his release from the Army joined the Veterans Administration.

Dr. Robert J. Scott, who has been director of professional services at the Veterans Administration Hospital in Richmond, Va., has been appointed manager of the VA hospital in Fort Wayne, Ind.

Dr. Scott, a native of Virginia, received his medical degree from the University of Virginia in 1940, and entered the Army Medical Corps in 1941 and served until October 1945 at which time he joined the Veterans Administration.

## New York Chapter

## OFFICERS ELECTED

At a meeting of the New York Chapter of the Association of Military Surgeons which was held at the U. S. Naval Hospital, St. Albans, New York, December 11, 1958, the following officers were elected: President Col. James Q. Simmons, Jr., MC, USA; 1st Vice-President, Col. Wilbur A. Smith, MC, USAF-R; 2nd Vice-President, Major Edward A. Barnett, MC, USAR; Secretary, Captain Samuel Candel, MC, USNR; Treasurer, Col. Francis N. Kimball, USAF-R, Ret.

The address of the president is Medical Section, First Army Area Headquarters, Governors Island, New York; and that of the secretary, 189 Ocean Ave., Brooklyn 25, New York.

A meeting of the chapter is planned for May, the date to be announced later.

## Miscellaneous

### DIRECTORY OF BLOOD FACILITIES

The Joint Blood Council, Inc., of Washington, D.C., of which Dr. Frank E. Wilson is executive vice-president, has released the first comprehensive directory and description of blood facilities and services ever compiled in this country.

Of the 2,202 cooperating blood facilities, 1,832 administer whole blood. Also 1,287 administer plasma, 1,021 serum albumin, 994 packed red blood cells and 311 platelets.

Copies of the directory may be obtained for \$1.50 by addressing the Joint Blood Council headquarters, 1832 M St., N.W., Washington 6, D.C.

### PEDDLING OF DRUGS

New York City has banned door to door peddling of vitamins, drugs, and other medicinals. This practice should be banned in every city in America.

Reputable products are available in reputable stores and that is the place to get them. Health is not a thing to be tampered with. Neither is the peddling of these products an economy measure for who can determine except by chemical analysis the content of the products? Sugar of milk can be made into tablets that are innocuous in themselves but could be sold at a high price under another name.

So we say let's ban the hawker of drugs, vitamins and other medicinals from our streets.

### MATERNAL MORTALITY

The maternal mortality rate in this country has declined 93% in the last four decades. One maternal death occurs in approximately 2,300 live births today, compared with one maternal death for each 165 live births in 1915.—*Progress in Health Services*, Health Information Foundation.

### EIDOPHOR

Pronounced EYE-doe-for and meaning "image Bearer" this word (Eidophor) has

been coined as a trademark for the control layer television projector which was invented in Switzerland by Dr. Fritz Fischer. It is claimed that greater accuracy in projection of color images is obtained and theater screen-size color pictures are bright and sharp.

Ciba Pharmaceutical Products Inc., of Summit, New Jersey has incorporated Eidophor into a closed circuit television system for educational use by scientific groups in the United States.

### BOOKS

The Library at the University of Moscow has 8 million volumes; Leningrad, six million. Other universities not more than 30 years old have over a million books. Journals are flown in from all over the world. In America there aren't more than a handful of universities with million-volume libraries. Nearly 60% of the books in Russian libraries are in the exact, natural and applied sciences.

### INTERNAL MEDICINE SEMINAR

A full time Seminar in Internal Medicine will be held at the New York Post-Graduate Medical School from April 6 through May 29. Registration may be for the entire course or part time in the various sessions, such as Allergy, Arthritis, Cardiology, Clinical Electrocadiography, Endocrinology, Gastroenterology, Hematology, Renal Failure and Hypertension. For further information address: Office of the Associate Dean, 550 First Ave., New York 16, N.Y.

### MEDICAL WRITERS INSTITUTE

The Second Annual Medical Writers' Institute will be held June 15-17, 1959 at Rensselaer Polytechnic, Troy, New York. Inquiries should be addressed to Professor Jay R. Gould, Rensselaer Polytechnic Institute.

### MEETING

The American Public Health Association has announced that its 1959 meeting will be held in Atlantic City, October 19-23.

## OPHTHALMOLOGY CONGRESS

The Sixth Pan American Congress of Ophthalmology will be held in Caracas, Venezuela, January 31 to February 7, 1960. Those wishing to participate in the program should contact Dr. James H. Allen, New Orleans.

The Secretary-Treasurer for North America is Dr. J. W. McKinney, 921 Exchange Building, Memphis, Tenn.

## GASTROENTEROLOGY MEETING

The VIth Meeting of the Association of the National European and Mediterranean Societies of Gastroenterology will be held in Leiden, the Netherlands, from April 20 to 24, 1960.

Languages to be used are: English, French, German, Spanish. For further information write: Congress Office, Department of Gastroenterology, University Hospital, Leiden, the Netherlands.

## Deaths

BRACKNEY, Edwin L., Colonel, U. S. Army, Medical Corps, Retired, died November 13, 1958 at the 1360th USAF Hospital, Orlando Air Force Base, Florida, at the age of 70. He was a graduate of Hahnemann Medical College in 1915 and entered the Army Medical Corps in 1917. He was retired in August 1948. His address had been P.O. Box 204, Windermere, Fla.

GANDY, Charles L., Colonel, U. S. Army, Medical Corps, Retired, died at Mesilla Park,

New Mexico on November 12, 1958 at the age of 69. He was a native of Texas and a graduate of the University of Michigan, class of 1912. He entered the Army Medical Corps in 1913 and was retired January 31, 1949. Colonel Gandy was Honor graduate and medallist of the Class of 1914, Army Medical School.

LASALLE, Harrison J., Lieutenant Commander, Dental Corps, U. S. Navy (retired), died November 28, 1958 in Coronado, California. He was retired in February 1940. His home address was 870 H Avenue, Coronado, Calif.

TEMPLE, Claude O., Major, Medical Corps, U. S. Army, Reserve, died November 29, 1958 in Chicago, Illinois. During World War II he served with the 69th General Hospital overseas. Later he served at the Station Hospital, Camp Hood, Texas, and at the William Beaumont General Hospital, El Paso, Texas. He returned to the private practice of surgery in Chicago in 1946. He is survived by his wife who resides at 1300 West 87th St., Chicago 20, Ill.

TAMRAZ, John M., Colonel, Medical Corps, U. S. Army (retired), and his wife, were killed on December 8, 1958 at Richmond, Georgia. Colonel Tamraz was 69. He was a native of Persia and at the age of 16 came to America. He received his medical degree from the College of Physicians and Surgeons, Columbia University in 1917 and a year later was commissioned in the Army Medical Corps. In 1949 he was retired and made his home in Miami, Florida.





## NEW BOOKS

Books may be ordered through this association.

- Aviation Medicine*, An Annotated Bibliography, Arnold J. Jacobius, Madeleine J. Wilkins, Ludmila Kassianoff, Rita B. Slie, Sam L. Whitehead, Aero Medical Association, St. Paul, Minn. Price \$5.00.
- Lippincott's Handbook of Dental Practice*, edited by Louis I. Grossman, D.D.S., J. B. Lippincott Co., Philadelphia, Pa. Price \$14.00.
- Cardiac Arrest and Resuscitation*, Hugh E. Stephenson, Jr., M.D., C. V. Mosby Co., St. Louis, Mo. Price \$12.00.
- Physiology of Spinal Anesthesia*, Nicholas M. Greene, M.D., Williams & Wilkins Co., Baltimore, Md. Price \$6.00.
- Diseases of The Nervous System*, Sir Francis Walshe, M.D., D.Sc., F.R.S., Williams & Wilkins Co., Baltimore, Md. Price \$8.00.
- Lipidoses*, Siegfried, J. Thannhauser, M.D., Ph.D., Grune & Stratton, Inc., New York, N.Y. Price \$19.75.
- Problems of Addiction & Habituation*, edited by Paul H. Hoch, M.D. and Joseph Zubin, Ph.D., Grune & Stratton, Inc., New York, N.Y. Price \$6.50.
- Pulmonary Circulation*, An International Symposium Sponsored by The Chicago Health Association, Edited by Dr. Wright Adams and Dr. Ilza Veith, Grune & Stratton, Inc., New York, N.Y. Price \$4.50.
- Preventive Medicine in World War II*, Vol. IV, *Communicable Diseases*, Editor in Chief, Col. John Boyd Coates, Jr., MC, Editor for Preventive Medicine, Ebbe Curtis Hoff, Ph.D., M.D., Assistant Editor, Phebe M. Hoff, M.A., Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C. Price \$5.50.
- Nautilus 90 North*, Commander William R. Anderson, USN, with Clay Blair, Jr., The World Publishing Company, Cleveland, Ohio. Price \$3.95.
- Diseases of Children in the Subtropics and Tropics*, H. C. Trowell, O.B.E., M.D., F.R.C.P., and D. B. Jelliffe, M.D., M.R.C.P., D.C.H., D.T.M. & H., Williams & Wilkins Co., Baltimore, Md. Price \$18.50.
- Reversible Renal Insufficiency*, Diagnosis and Treatment, Donald H. Atlas, M.D., Ph.D., F.A.C.P., and Peter Gaberman, M.D., Williams & Wilkins Co., Baltimore, Md. Price \$7.00.
- Surface and Radiological Anatomy*, For Students and General Practitioners, A. B. Appleton, W. J. Hamilton, Ivan C. C. Tchaperoff, Fourth Edition by W. J. Hamilton, M.D., D.Sc., F.R.S.E., and G. Simon, M.D., B.Ch., D.M.R.E. (Cantab.), F.F.R., Williams & Wilkins Company, Baltimore, Md. Price \$9.50.
- Nurse-Patient Relationships in Psychiatry*, Helena Willis Render, R.N., B.S., and M. Olga Weiss, R.N., M. Litt. McGraw-Hill, New York. Price \$5.95.
- Le Cancer de la Prostate*, Son Diagnostic Son Traitement Radiumtherapie, Raymond Darget, Masson et Cie, Editeurs, 120 boulevard Saint-Germain, Paris 6, France. Price 2,500 fr.
- La Fonction Spermatogenetique de Testicule Humain*, H. Bayle, C. Gouygou, G. Guillon, Masson et Cie, Editeurs, 120 boulevard Saint-Germain, Paris 6, France. Price 6,000 fr.
- Hematologie Clinique*, Jean Bernard, Marcel Bes-sis, Masson et Cie, Editeurs, 120 boulevard Saint-Germain, Paris 6, France. Price 14,500 fr.

## BOOK REVIEWS

**ORTHOPEDIC DISEASES.** Physiology, Pathology, and Radiology. By Ernest Aegerter, M.D., Professor of Pathology and Director of the Department of Pathology, Temple University Medical Center; and John A. Kirkpatrick, Jr., M.D., Radiologist, St. Christopher's Hospital for Children. 602 pages, 354 figs. W. B. Saunders Company, Philadelphia and London. Price \$12.50.

Aegerter and Kirkpatrick have written a most excellent book concerning the present day knowledge of the basic science aspect of bone disease. This makes the material of this type available to the clinician to increase his diagnostic efficiency. It should be of value to the radiologist, the pathologist and the orthopaedist. Needless to say, the young specialist studying for his board examinations and the medical student would find this volume invaluable.

The book is divided into four sections. The first section concerns connective tissue and has such information as the "Cellular Components of Connective Tissue," for instance collagen fibrils times 18,300 taken with an electron microscope are beautifully illustrated. Bone production with the essential factors, the histology and radiology of the musculoskeletal system are taken up in this section.

Section II deals with disturbances and skeletal development.

Section III discusses "Disturbances in the Normal Former Skeleton."

Section IV covers "Tumors and Tumor-like Processes."

The book will be of interest to all of those who deal with any phase of orthopaedic surgery. It is highly recommended by this reviewer.

W. COMPERE BASOM, M.D.

**ETIOLOGY AND TREATMENT OF LEUKEMIA.** Proceedings of the First Louisiana Cancer Conference, 1956; 16 contributors. Edited by Walter J. Burdette, Ph.D., M.D., F.A.C.S., Professor and Head of the Department of Surgery and Director of the Laboratory of Clinical Biology, University of Utah College of Medicine. 167 pages. The C. V. Mosby Co., St. Louis. 1958. Price \$4.00.

This book contains twelve lectures, six on the etiology and five on the treatment of leukemia. The final, twelfth chapter is a summary written by the Editor.

The editing of this book is excellent. It praises Dr. Burdette that he so successfully transformed

the lectures into chapters which read just as easily and well as the lectures did when they were heard. They are lucid and brief and give an excellent bird's-eye view of the present state of these highly important and fascinating problems. Facts and their differing interpretations are brought sharply into focus. Their directness is refreshing and revealing.

This book can be wholeheartedly recommended for every physician. It is a rare occasion to get such a wealth of information, organized and presented in such a clear and enjoyable way.

Dr. Arthur Kirschbaum wrote the chapter on the "Etiology of Leukemia" in this volume. The sudden departure last May of this outstanding researcher and dynamic, fine person shocked everyone. It is very appropriate that the book is dedicated to his memory.

GEORGE J. ANDAY, M.D.

**OPHTHALMIC PLASTIC SURGERY.** 2nd Revised Edition. By Sidney A. Fox, M.S. (Ophth.), M.D., F.A.C.S., Associate Clinical Professor of Ophthalmology, New York University Post-Graduate Medical School. 324 pages, 149 figs. Grune & Stratton, New York and London. 1958. Price \$15.00.

This is a good text book on ophthalmic plastic surgery. The various operative procedures are well illustrated. They are sufficiently detailed for the reader to follow the technique accurately. Good judgment has been used in the selection of the various types of operations that have been chosen for description. This conforms to the author's wish that the book be kept from being too voluminous. Some of the simpler procedures are omitted to give more space to those procedures that are more difficult, or that require sufficient illustrating.

The outline of the text and the order of presentation indicate that the author is an excellent teacher. The descriptions of surgical anatomy and the basic principles of ophthalmic plastic surgery are clear and concise. The chapter on technical details includes modalities that the author has found useful. Skin grafts are especially well described and illustrated. The first aid of lid injuries is given the necessary emphasis. The evolution of the technique for correcting entropion, ectropion, and ptosis are explained. Socket reconstruction techniques are described to conform with the observations and experiences of the author. The methods of handling

malignancies of the lids and eyebrows are based on the author's scholarly evaluation of the latest research on this problem.

This book is enthusiastically recommended to every ophthalmologist or any surgeon interested in ophthalmic plastic surgery.

COL. ROLAND I. PRITIKIN, MC, USAR

**A SHORT HISTORY OF ANATOMY AND PHYSIOLOGY FROM THE GREEKS TO HARVEY.** 2nd Ed. By Charles Singer, Par, Cornwall. 209 pages, illustrated. Dover Publications, Inc., New York. Price \$1.75.

This handsome, richly illustrated volume, which is a brief outline of the history of anatomy and physiology from the classical antiquity to the discovery of blood circulation, is actually a reprint of the work issued more than thirty years ago in England except for a few minor adjustments by the author. Professor Singer, who is close to eighty years now, is the oldest living member of that very fertile group of medical historians which included such men as Garrison, Sigerist, Neuburger, Sudhof, Aldo Mieli, and others. His work is easy to read, and its illustrations are a pleasure to look at.

CLAUDIUS F. MAYER, M.D.

**DISEASES OF THE THYROID AND PARATHYROID GLANDS.** By Bernard J. Ficarra, M.D., D.S., Research Associate in Biology, Post-Graduate School, Long Island University. 295 pages, illustrated. Intercontinental Medical Book Corp., New York. Price \$8.50.

In assembling this compact treatise, the author has called upon a wide experience, particularly surgical, in the treatment of various diseases of the thyroid and parathyroid glands.

The book is devoted primarily to thyroid disorders with only a short chapter on the parathyroid gland. Some of the statements concerning the etiology of thyroid hyperfunction and thyroid physiology are open to question and only briefly discussed. The pharmacology of the antithyroid drugs is scant and for this reason lacks clarity. The chapter on thyroiditis is quite incomplete. The illustrations are for the most only fair and sometimes not correlated to the portion of the text wherein they appear. These few criticisms, however, detract very little from the overall value and quality of the text.

A section on the Recognition of Neck Masses is very nicely presented and should aid many in the evaluation of tumors in the cervical region. Although not frequently seen in the modern therapy of hyperthyroidism, thyroid crisis must always be entertained as a possibility. The author has described the theories of etiology, the prevention of and the treatment of this entity very adequately.

Further mention of adrenal exhaustion might however have added a little to this chapter. A well selected and up-to-date bibliography appears at the end of the book.

The approach to thyroid disease seems balanced slightly in favor of surgical treatment, but the book should be of interest to both physicians and surgeons concerned with disorders of the thyroid and parathyroid glands.

R. G. MUTH, M.D.

**DISEASES OF THE ESOPHAGUS.** By J. Terracol, Professor of the Faculty of Medicine of Montpellier, France; and Richard H. Sweet, Associate Clinical Professor of Surgery, Harvard Medical School. 682 pages, 408 illustrations. W. B. Saunders Company, Philadelphia and London. Price \$20.00.

Here, indeed, is a brilliant compilation of the medical and surgical knowledge of the esophagus between the covers of a single volume.

The twenty-nine chapters of this book cover the entire subject in a logical and orderly manner. The entire text is profusely illustrated with many diagrams, microphotographs, charts, and esophagoscopic pictures. A valuable and voluminous bibliography is included which should be of great importance to students of the esophagus.

In the English revision of Professor Terracol's book, a glaring omission was the total lack of any description and outline of the use of the flexible esophagoscopes.

The text would indicate that esophagoscopy is in about the same relative position to clinical esophageal exploration as was gastroscopy with the rigid gastroscope before Wolf and Schindler introduced the flexible gastroscope in 1932. This is not so.

However, with the use of the flexible esophagoscope, it is important for endoscopists to know the dangers, more difficult with the rigid esophagoscope, for more intelligent conduct of esophagoscopy.

This work should be in the private library of every person interested in the esophagus.

A. A. HALL, M.D.

**ORR'S OPERATIONS OF GENERAL SURGERY.** 3rd Edition. By George A. Higgins, M.D., F.A.C.S., Associate Professor of Surgery; and Thomas G. Orr, Jr., M.D., F.A.C.S., Associate in Surgery; both of the University of Kansas School of Medicine. 1016 pages; 1990 Step-by-Step illustrations on 835 figures. W. B. Saunders Company, Philadelphia and London. Price \$20.00.

The new authors of this third edition have not only revised and brought up to date the material contained in the second edition, but have extended and added new material and technics, particularly in the fields of thoracic, vascular and bowel surgery, resulting in 114 more illustrations and 116 more pages.

This volume is primarily a descriptive and well-illustrated text of surgical technic. However, the authors also give general considerations of, indications for, and dangers associated with many of the procedures. It is very complete and encompasses all fields of general surgery. While experienced operators will find individual areas of difference of opinion with the authors, the procedures described are sound, practical, and well established. This volume is not only an excellent general reference with an adequate bibliography for the practicing surgeon, but the clear, complete and concise descriptions and illustrations are an invaluable aid to the surgical student in developing a thorough knowledge of the various surgical procedures.

LT. COL. EDWARD H. VOGEL, Jr., MC, USA

**INFECTIOUS DISEASES OF CHILDREN.** By Saul Krugman, M.D., Associate Professor of Pediatrics, New York University College of Medicine; and Robert Ward, M.D., Professor and Head of the Department of Pediatrics, University of Southern California. 340 pages, 44 illustrations and 7 color plates. The C. V. Mosby Company, St. Louis. Price \$10.00.

Doctors Krugman and Ward, after extensive practical experience with contagious diseases in children, and many fruitful years of research, have pooled their talents to produce a noteworthy book.

The text is systematic, concise and perfectly clear. It avoids discussions of speculative material, which is usually of interest to a limited few. The well selected tables and figures are graphic.

A highlight is the chapter on diagnosis of acute exanthematous diseases. Here, placed side by side in unforgettable contrast, are the illustrated courses and distributions on the skin of the common exanthems.

This book should be particularly useful in teaching contagion to medical students, interns, and residents. It will also appeal to pediatricians, general practitioners, and all who encounter contagious illnesses in practice.

Good quality paper, easy reading print, and handsome binding compliment the solid material between the covers.

MAJOR EDWARD J. TOMSOVIC, MC, USA

**INTRODUCTION TO PSYCHIATRIC NURSING.** 2nd Ed. Marion E. Kalkman, R.N., M.A., Ass't. Professor, Advanced Program in Psychiatric Nursing, University of California School of Nursing. 331 pages. McGraw-Hill Book Co., Inc., New York, Toronto, London. Price \$5.95.

Miss Kalkman demonstrates a wide background of information in her field in this edition of her book.

This text is absorbing reading for nurses in the field of psychiatry. In the military hospital, it would be an excellent addition to the ward library for use of personnel in their continuing in-service education program.

The organization of the book follows the newer concepts of psychiatric nursing. The developmental approach is followed in Part I "Understanding the Patient" and psychoanalytic philosophy is much in evidence.

Part II covers all the fields of therapy, and of special interest is her discussion of the nurses role as a therapist.

Part III is "How the Psychiatric Nurse Works." Her presentation of common problems encountered by nursing personnel in psychiatry (such as feelings of inadequacy, acceptance of and working through the problems of hostility, and handling of patients' expression of sexual impulses both directed towards herself and other patients) is clear and helpful.

The list of visual aids included in this text will especially interest those nurses responsible for teaching in this area.

MAJOR SELMA M. BRAWNER, ANC

**CLINICAL ORTHOPAEDICS #11.** "Orthopaedic Surgery in the Geriatric Patient." By Anthony F. DePalma, Editor-in-Chief. 245 pages, illustrated. J. B. Lippincott Company, Philadelphia and Montreal. Price \$7.50.

This eleventh of a series, published every Spring, Summer and Fall, considers a special section entitled "Orthopaedic Surgery in the Geriatric Patient." Following this was a multiple article section considering general orthopaedic problems. None of the articles on the section on "Orthopaedic Surgery in the Geriatric Patient" offered anything new, and this reviewer does not suggest a busy reader taking much time with them. The section on "General Orthopaedics" had many interesting articles. A new operation for correction of paralytic foot drop by Gene D. Caldwell is worth every orthopaedic surgeon's consideration. Dr. Joseph C. Risser expounded excellently upon the iliac apophysis and scoliosis, and Doctors Wright and Brady had an excellent review of the anatomical evaluation of "whiplash" injuries. Another article which should be of interest is one on Morquio's Disease by Dr. Robinow. All in all, this section of the book makes its purchase worthwhile.

DAVID C. KELLSEY, M.D.



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